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# QUEENSLAND AGRICULTURAL JOURNAL

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## Event and Comment.

### The Current Issue.

Much interesting matter will be found in this issue, including the conclusion of the series of articles on the organisation of the agricultural industry in Queensland dealing particularly with agricultural education. The conference of dairy factory managers, one of the notable agricultural events of the month, has focussed attention on the importance of dairying, second only to sugar, to Queensland; and a report of the proceedings, together with the first of a series of papers dealing with various phases of the industry and which were read at the conference, contains much of interest to dairymen, as well as to those engaged in the manufacturing and merchandising of dairy products. Other features include a progress report of the entomologist specialising on the Banana Beetle Borer pest (Mr. John L. Froggatt, B.Sc.), an announcement of Federal Sugar Policy, and a continuation of a summary of experiments carried out by the Bureau of Sugar Experiment Stations. Other regular features cover a wide field, and are excellently illustrated.

### Plant Resources for Motor Fuel.

The ever-increasing use of internal combustion engines, both for transport and other agricultural purposes, adds to the general demand for fuel. It becomes necessary, therefore, to take stock of every possible source of supply, and the question of utilisation of vegetation and plant residues is of considerable technical and economic importance. The gradual depletion of crude petroleum accentuates this fact, and a digest of the most recent literature on the subject contained in the "International Review of the Science and Practice of Agriculture" (N.S., Vol. 1, No. 1, p. 208, Jan.-Mar., 1923) is most valuable at the present time. Experiments on a large scale have been in progress in the United States, Philippines, and Cuba to ascertain the comparative values of alcohol from various sources, and it is estimated that the Nipa palm (*Nipan fructicans*, Wurmb.) and "blackstrap" molasses offer the cheapest and most easily manipulated and valuable sources of power alcohol. As a motor fuel, especially for internal combustion engines, alcohol possesses certain outstanding advantages; the combustion is marked by cleanliness and freedom from any carbon deposit; alcohol is "softer" than benzine, and the running of the engine is smoother; alcohol stands high initial compressions without knocking, and permits the use of available horse-power of a definite size of motor to be greater than when petrol is employed; lubrication difficulties are not likely to occur; so far no corrosion

has appeared in the valves and no acids in the exhaust. Difficulties such as low-heating value will be overcome in due course if certain practical points are observed:—(1) Alcohol is more efficient in engines of low piston and long stroke; (2) the circulating water should be kept as hot as possible; (3) the inlet air should be well pre-heated; alcohol will not vapourise at ordinary temperatures; (4) high cylinder temperatures are required; (5) the jet orifice should be enlarged so as to increase the fuel supply about 50 per cent.; (6) metal carburettors should be used. As to cost, the digest gives a clear statement of the cost of an alcohol motor fuel plant producing 1,000 gallons per day (these figures were derived from the result of practical experience in the erection and operation of numerous distilling plants in the Philippines), as follows:—£5 labour, plus £16 (approx.), fuel, plus £6 (approx.), interest, depreciation, and other charges. In this case, cane molasses was the sole source of alcohol, and the figures give a general idea of the cost and value of molasses as fuel. The comparative low cost of production, as proved by the experiments and operations, suggests the practicability of turning the Queensland molasses production into a more economical account on a scale larger than has hitherto been attempted.

**Egg Pool Ballot.**

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that the referendum in connection with the proposed egg pool was 550 votes in favour of the pool and 70 votes against. Action will accordingly be taken to submit to the Executive Council a minute for the creation of the proposed pool. It may be stated that this pool will apply to all owners of 100 fowls or over in that part of Queensland east of a straight line drawn from Bundaberg to Goondiwindi.

The vote for the Egg Board resulted as follows:—

*District No. 1* (roughly from Caboolture to Bundaberg)—
Harold Gowen, of Glass House Mountains .. .. 65 votes.
Edwin Alfred Smith, of Maryborough .. .. 48 votes.

*District No. 2* (North Brisbane as far as Caboolture)—
Percival Rumball, of the Gap, Enoggera .. .. 91 votes.
Jas. Stevingstone Kerr, Eagle Junction .. .. 64 votes.

*District No. 3* (South Brisbane, Wynnum, and Cleveland)—
Matthew Hale Campbell, of North Pine .. .. 86 votes.
William Hindes, of Manly .. .. .. .. 38 votes.

*District No. 4* (roughly, West Moreton and the Logan)—
Henry Moreton Stevens, of Lanefield .. .. Unopposed.

*District No. 5* (roughly, the Darling Downs)—
Charles Edward Smith, of Toowoomba .. .. Unopposed.

**Opossum Trapping—Flashlights Prohibited.**

The Animals and Birds Act specifically prohibits the use of flashlights in opossum hunting, and this prohibition is in line with similar practice in other countries where furred animals are economically valued. It is well known that the use of flashlights is even more effective in opossum extermination than cyanide, and the use of both is prohibited under heavy penalties. Moreover, the use of flashlights causes serious losses to stockowners, by disturbing and startling cattle on the runs. Last year the loss was so serious in some districts as to compel stockowners to remove their cattle from opossum country. Users of these lights are also considered to be a nuisance to legitimate opossum-trappers, and the Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that the prohibition of flashlights will be rigorously enforced during the current open season.

**Taking Technical Education to the Country.**

In furtherance of its scheme for the extension of the domestic science system, the Department of Public Instruction is having two travelling cars constructed at the Ipswich railway workshops. The Minister for Public Instruction (Hon. John Huxham) has completed a plan for extending technical education to country districts by means of these cars and an efficient instructional staff. In the course of a recent announcement Mr. Huxham stated that the cars would be completely fitted for domestic science class purposes, and they would travel over the railways in areas not now served by technical colleges or rural classes. One of the cars would be used for the region west of Roma on the Southern and Western line, and the other would be run on the western section of the Great Northern system, which extends from Townsville. When the link between Longreach and Winton was built a car would also serve that stretch of country. It was intended that these cars should be switched into sidings at selected centres, remaining there for six weeks, during which intensive instruction would be given in dressmaking, millinery, cookery, and similar activities associated with domestic science. Altogether, the project was well advanced towards its practical application.

### The Value of Attention to Detail.

The recent butter and cheese exhibition by the Dairy Factory Managers' Association in Brisbane provided some interesting and instructive examples of how not to do things. The great bulk of the exhibits were products of perfect manufacture and presentation, but the Director of Dairying, Mr. E. Graham, detected several little faults that marred an otherwise excellent display. One box of butter was distinctly rancid on the surface, though a sample from the middle of the box showed it to be a first-class product. The deterioration in the surface butter was due to the careless way in which the paper had been folded on the top of the box, allowing an air pocket between the paper and the butter. This air had oxidised the surface of the butter and caused the deterioration in flavour. Another entry had been sent in a second-hand box of very dirty appearance. Mr. Graham pointed out that the factory which had sent it in had a reputation for producing a very high class butter, had its own box factory, yet, to save a few pence, had used a box which had ruined the product.

### Control of the Cotton Industry.

Communications received by the Department of Agriculture and Stock indicate that there is a feeling among some cotton-growers that the Government is losing control over the industry. The exact position is set out in a letter from the Under Secretary (Mr. E. G. E. Scriven) to a Local Producers' Association in one of the cotton regions.

In that communication Mr. Scriven pointed out that instead of losing control the Government, on the contrary, was moving rather towards tightening its powers of control, and at present was the holder, under the proclamation of the Governor in Council, of all cotton in Queensland. It was quite possible that that power would be accentuated during the next session. The Under Secretary further pointed out that the instructional staff was being added to as the need arose, and everything was being done to place the industry upon a sound foundation. The connection with the British-Australian Cotton Association was one of agency only. The Cotton Association merely ginned and sold on behalf of the Government, and had no right or title in the resulting raw cotton, which was the property of the Government on behalf of the growers. The association could not depart from the terms of the agreement made for that purpose.

### The Cinema in Agricultural Education.

The use of moving pictures in agricultural education has been suggested in the old country, and a society interested in rural progress has entered on the preparation of a set of films. A perusal of French exchanges also indicates an acceptance of the idea in agricultural circles in France, and the Ministry of Agriculture has authorised an annual grant of 500,000 francs for the purpose of installing in agricultural colleges and schools in the rural communes cinematographic apparatus for use in popularising scientific agriculture. In Italy, the use of films for agricultural propaganda has also been largely developed. There the authorities are concerned with technical agricultural instruction and improved crop yields; the films are lent free of charge (except for cost of carriage) to all agricultural bodies who make application for their use. In Germany also, attention is being given to the possibilities of film instruction; and with the great agricultural advance foreshadowed in Queensland there is no doubt that the use of fitting films on farming subjects will, in due course, be considered.

### Progressive South Burnett.

For a district only about fifteen years old, from the viewpoint of closer settlement, the South Burnett, which embraces that rich stretch of scrubland stretching from Nanango to Boubyjan, has made extraordinary strides along the road of agricultural and commercial progress. In spite of occasional dry spells its advance has been both rapid and solid. Dairying, maize-growing, and pig-raising have been its staples, but now cotton is also coming into its own as a substantial wealth winner. Another source of district richness is the high value of the personal equation. Peopled by settlers from the older farming communities in West Moreton, Fassifern, and the Southern States, who knew how to make the best of the raw material, in the form of rich virgin country, the South Burnett simply had to move forward. A notable feature of its agricultural life is the practical interest taken in herd improvement. Probably no other agricultural district in Australia possesses so many stud stock establishments, and at the annual shows at the district's main centres—Nanango, Kingaroy, Wondai, and Murgon—may be seen some of the finest breeding stock in the State. Another notable feature of local progress is the number of farms connected by telephone with the business centres. For evidence of agricultural progress generally, the South Burnett, as a comparatively newly settled district, would be hard to surpass in the Commonwealth.

# ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—IV.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In the second instalment, which appeared in the April Journal, various phases of American marketing methods, relating more particularly to fruit, but capable of more or less diversified application, were discussed. The third article (May) was a continuation of the series and dealt with primary producers' marketing problems and co-operation generally. This article concludes the series, and covers generally agricultural organisation, education, and extension; and discusses the applicability of tested modern methods to Queensland conditions.—Ed.

## AGRICULTURAL EDUCATION.

### Its Organisation and Co-ordination.

In previous articles we have dealt with organisation, marketing, and co-operation as applied to agriculture and have endeavoured to draw helpful conclusions from the experience of farmers in other countries. Now that the primary producers of Queensland are organised in the Queensland Producers' Association, it remains to be considered whether in the solution of their problems they can be assisted by Agricultural Education; and, if so, how such education may be provided so as to reach, not only the farmers of to-morrow, but also those of to-day who would be willing to avail themselves of study if reasonable facilities were provided.

One of the most popular of modern slogans is "Organise, organise." But in the union of educational institutions with the agricultural industry the watchwords should be "Educate and organise." A new era seems to be dawning for the man on the land, the woman on the land, the child on the land. Australians as a whole are beginning to realise as they have never realised before how much Australia depends upon her primary industries; city folk are awakening to the general disabilities, the ups and downs of the land folk; conviction is growing that the country dweller is just as much entitled to his share of world goods as is the town dweller; more and more is it being felt that insecurity should be replaced by reasonable stability. As for the primary producer himself, more and more is he determined to have a larger share in the management of his business. In that determination right is on his side; and it is just here that education comes in. Contrast the preparation for town occupations with the preparation for purely land occupations. For the skilled trades, there are trade schools, technical college classes, and a fairly well-developed form of apprenticeship; for commercial occupations, there are the secondary schools, technical college classes, and the Commercial Junior Examination of the University; for the professions—medical, legal, engineering, church, &c.—there is liberal provision, either wholly or in part. Excepting, however, Gatton College and a few Rural Schools, there is little provision for the specialised preparation for the land occupations. If the land man desires to take as intensive a part in the management of matters pertaining to the land as the city man takes in matters pertaining to the city, the land man will have to be as carefully prepared and trained as the city man is. Especially will this be so in the case of the leaders. Thus agricultural education must play its part, and hence will be understood the inner meaning of the watchwords—"Educate and organise."

Consider for a moment the miscellaneous knowledge which land men should have—for example: Knowledge of soil selection; timber selection; farm planning; building construction and trade work generally; herd selection; properties of foods; cultivation methods; first-aid; and the care of plants and animals, including the treatment of diseases. Consider also the positions which they are called upon to fill as leaders in the rural communities—shire councillors, school committee men, members of local producers' associations and district councils of the Council of Agriculture, directors of co-operative trading concerns—such as butter factories, supply associations, market associations. Keeping all these things in view, an adequate scheme of agricultural education should provide a means whereby the future farmers, and

particularly the leaders of the agricultural industry and those State and other officials whose occupations bear directly upon rural pursuits, may be educated suitably. The bridge of education must span the abyss between "unskilled" and "skilled."

## AMERICAN AGRICULTURAL EDUCATION.

In the United States of America, the Colleges of Agriculture have taken a leading part in the development of the agricultural industry and in the training of agricultural experts, officials, and practical agriculturists. The College of Agriculture of the University of California may be regarded as a typical American College of Agriculture. That college has three functions—namely, research, resident instruction, and extension. The college offers curricula designed for various purposes—

(*a*) To train for the pursuit of farming.
(*b*) To train for responsible positions as teachers in agricultural colleges, investigators in experiment stations, for extension work in agriculture, and for service in the United States Department of Agriculture.
(*c*) To train for technical positions in industries closely allied to agriculture.
(*d*) To train for the teaching of agriculture in the high schools.
(*e*) To develop a recognition of public service.

The college offers over 200 courses of instruction in technical subjects besides opportunity to select subjects from the scientific and literary offerings of other colleges of the University.

### The College.

The headquarters of the college are at Berkeley, a city of 67,000 inhabitants, distant thirty-five minutes from San Francisco by train and ferry, and twenty-five minutes by tram from the business centre at Oakland. The site contains 530 acres (including an experimental farm of 30 acres), and in the vicinity there are many establishments dealing in the products of agriculture—canning and preserving factories, slaughter-houses, dairy manufacturing plants, &c. There are also opportunities for studies in marketing by reason of the large population and the necessarily large amount of food transported from the great agricultural sections near by. Within easy reach also there are several thousand acres of hardwoods and other timbers.

On account of the insufficient area of land at headquarters for practical farming operations, however, it has been found necessary to establish a "College Farm" at Davis (65 miles distant from Berkeley), where an area of 780 acres has been permanently secured and an additional 300 acres are leased. The distance between the two establishments has proved a hindrance, and it has become necessary to arrange that students taking certain courses shall spend certain portions of their time at Davis and the remainder at Berkeley. To provide for scientific and other academic work of the students while at Davis it has also become necessary to duplicate to some extent the laboratories and University equipment.

Berkeley is regarded as the headquarters of the divisions of agricultural education, agronomy, citriculture, entomology, forestry, farm management, genetics, landscape gardening, nutrition, plant nutrition, plant pathology, pomology, rural institutions, soil technology, veterinary science, and viticulture. Laboratories are in existence in connection with the work of eleven of these divisions.

### The Farm School.

At Davis there are numerous buildings for instruction in various phases of agriculture and horticulture, including chemistry, dairy industry, horticulture, soils and irrigation, poultry and veterinary science buildings; two stock judging pavilions; agricultural engineering shops; barns and sheds for horses, dairy and beef cattle, sheep, milk goats, swine, and poultry; one concrete silo and seven wooden silos.

The more important breeds of various classes of farm animals are kept and used in class work, feeding of cattle being an important part of animal husbandry work. A well-equipped poultry farm is stocked with several thousand fowls of a number of leading varieties.

A large acreage is devoted to investigations with field crops, 150 acres of orchards and vineyards yielding valuable data in various phases of fruit culture and furnishing actual practice in spraying, pruning, budding and grafting.

There are ample areas for growing vegetables, and the college has a modern irrigation system.

Farming interests in the vicinity are diversified—commercial orchards and vineyards, fields of miscellaneous grain crops, and pure bred stock farms.

Davis is regarded as the headquarters of the divisions of agricultural engineering, animal husbandry, dairy industry, irrigation practice, olericulture and poultry husbandry; but, as stated previously, work connected with several other divisions is also undertaken as a part of the Berkeley courses.

## RESIDENT INSTRUCTION.

### Degree Work.

The degree work involves four years' resident instruction, the last year being spent in the University of California. There are seven curricula leading to the degree of Bachelor of Science—

The Agricultural Science Course is primarily for the training of investigators in agricultural science and students intending to engage in institutional work either teaching or administration. Students who take agricultural science as their major course may specialise in one or more of such branches as entomology, fruit products, or soil technology.

The Agronomy Course offers a thorough and comprehensive training in the principles and practices underlying the production and utilisation of field forage crops, to meet the needs of students who plan to engage in farming as well as those who plan to pursue the teaching profession or engage in scientific work.

The Animal Industries Courses are intended to give the student a knowledge of farm machinery and buildings, all classes of livestock and their diseases, and the manufacture and testing of dairy products.

The Forestry Courses include training for—

(*a*) Forestry generally (not engineering).
(*b*) Management of forests and open grazing lands.
(*c*) Forest and logging engineers.
(*d*) Sawmill engineers and specialists in the manufacture and use of products made from wood.

The Horticulture Course deals with propagation and culture of flowers, vegetables, and all kinds of fruit plants, and the harvesting and marketing of their crops. The course is sufficiently elastic to meet the requirements of students preparing themselves for teaching or investigation in horticulture and for those who desire to engage in the actual production of crops.

The Landscape Gardening Course offers instruction (both technical and practical) to those who desire to become professional landscape artists and to others who may wish to become familiar with the fundamentals of the art of landscape design in order to become capable superintendents of construction.

The Rural Social Economics Course is designed to give students the necessary preliminary training for service in the spheres of Farm Management, Co-operative Marketing, Rural Organisation, Land Settlement, Agricultural Extension, and Agricultural Teaching in High Schools.

### Non-Degree Work.

The non-degree work is offered at the branch of the College of Agriculture, Davis, to students who have reached the age of eighteen years and who have not the requirements to enter degree work. The courses, which are primarily practical, are:—

A three-year course for persons eighteen years of age or older who have had the equivalent of a Grammar School education.

A two-year course for High School graduates who do not care for a thorough training in the fundamental sciences and cultural subjects required for a degree.

A one-year course for young men who can spare only that amount of time to increase their earning power.

A large proportion of the work is done in laboratory, field, shop, and stable, but a student cannot secure the benefit of practice without earnest study of textbooks, publications, and lecture notes.

The purpose of the courses is to increase the earning power of young men in agricultural work by better fitting them for the operation of their own enterprises or for some definite position as trained, skilled employees; to broaden their understanding of the sciences underlying the production of plant and animal products;

to familiarise them with the best farm practice and the economic laws of business; and to cultivate a knowledge of those influences which make for good citizenship.

Major work is offered in animal husbandry, dairy industry, horticulture, and poultry industry—the one-year course in horticulture, for example, including—General pomology, soils, entomological practice, rural and personal hygiene, irrigation, field crops, orchard and garden pests, and certain elective subjects.

### Short Courses.

Short courses and conferences of farmers at Berkeley and at Davis are also arranged to enable persons, especially those of mature years and experience, to acquire a knowledge of the fundamental principles of agriculture and of the results of the latest investigations in the production of fruit, field and forage crops, and live stock of various classes. The short courses are also open for those without experience but who wish to engage in some line of agriculture, to obtain theoretical and practical instruction that will prove of the greatest value to them in their farming operations. These courses, which are of one or two weeks' duration, include—General agriculture, poultry husbandry, deciduous fruits, dairy manufactures, land settlement and colonisation, fruit products, and bee-keeping.

## RESEARCH WORK.

In the matter of agricultural research the Federal Government of the United States provides certain funds for experimental work, and the State Governments also contribute. The results of the investigations are published in bulletins and circulars which are sent free to those farmers who desire to have them.

The State Department of Agriculture conducts little, if any, experimental work, but confines its attention to regulatory and legislative measures. Research is conducted by the University—its well-equipped laboratories, numerous field plots, and comprehensive library offering ample facilities. Special post-graduate work in tropical agriculture has been organised at the Riverside Graduate School of Tropical Agriculture and Citrus Experiment Station which has an area of 477 acres in the centre of the citrus region, and ample laboratories. Here the primary function is research and no regular lectures are given.

As an example of what is being done at the University laboratories it may be sufficient to cite the work in connection with fruit products laboratories at Berkeley. These laboratories are equipped for the semi-commercial production of canned and dehydrated fruits and vegetables, jellies, fruit juices, preserves, &c., and the bacteriological and chemical examination of these products. In addition there is located at the branch at Davis a commercial dehydrating plant in which practice in dehydration is afforded.

At a Californian Convention of Fruitgrowers, Mr. Frank T. Swett, President of the Californian Pear Growers' Association, in supporting the work of the Fruit Products Laboratories, stressing its usefulness to the industry, and urging more liberal financial support by the Legislature, said that in every line of fruit products there was need for preliminary investigation and work, and that the one place for the best investigation was the Fruit Products Laboratory of the University of California; the results obtained there were worth twenty, thirty, or forty times what that laboratory had ever cost the State; the staff did not solve all the problems; they made the preliminary investigations; then the commercial men getting in touch with them, got their fundamental data and built commercial enterprises on the results of that preliminary work. Mr. Swett further pointed out that with the tremendous increase in the fruit industries it was necessary to train young men to deal with the problems, not only in the laboratory but also to go out into the manufacturing establishments and keep on solving them.

## AGRICULTURAL EXTENSION SERVICE.

Agricultural extension work is accomplished through farm advisers, home demonstration agents, agricultural clubs, and correspondence. These agencies are striving to meet the demands of the people of California for the best scientific and practical information along agricultural lines.

The assumptions on which non-resident (or extension) work is undertaken is that the University has but two functions—the discovery and the diffusion of knowledge—and that the teaching should be done not only in the institution itself but wherever its agents can reach.

### Farm Advisers.

The farm advisers, supervised in turn by extension specialists, are trained agriculturists who are able to make known to farmers and groups of farmers the results of investigations made in the laboratories and on the experimental stations of the University. The practice has been to organise farmers into community groups known as farm bureau centres which serve as media through which the farm adviser may work effectively in teaching and home demonstration. The organisation of farm bureaux has already been dealt with in a previous article and need not be detailed here. Having formed the groups it has been found necessary in order to make definite progress year by year to lay down definite programmes of work, and each year the farm bureau centres lay out a definite plan for the following year. These programmes are rigidly adhered to, and have vitalised the farm bureaux movement, and greatly increased the efficiency of the extension work in agriculture.

### Home Projects and Agricultural Clubs for Juniors.

The home projects and agricultural clubs are inaugurated on the assumptions that many boys and girls wish to make money by farming, that the agricultural institutions have information which will help farmers to increase their profits, and that the chances of success are increased when several persons in a neighbourhood undertake the same work.

The home farm provides special advantages, inasmuch as it affords opportunity for a boy to gain experience in the application of farming principles which he learns at school. It enables him to practise the farming processes which he sees demonstrated, and it utilises equipment already at hand.

School and home, parent and teacher, are brought into close relationship, and this serves as a check on the instruction given by the teacher. Under such circumstances that instruction must be practical, and of local application.

The home project is intended to throw the boy on his own resources and develop his power of initiative, as well as give increased knowledge and skill in farming methods.

Financial profit is the definite aim of all such projects, as it is the aim of farming business as a whole. The aim may be that of immediate profit, as in the case of a production project, the object of which is to produce most efficiently at a minimum cost; or it may be more remote, as in the case of an improvement project, such as the keeping of records of a dairy herd with a view to eliminating cows below standard. Whatever the project, economic development is emphasised as the final goal.

It is expressly contended that the function of such projects is not to investigate or indulge in research, but to illustrate known processes the outcome of which are fairly well assured.

### Correspondence Courses in Agriculture.

These courses are prepared for farmers, farm managers, suburban dwellers cultivating land, prospective settlers, and others desiring specific and detailed information on the production of farm crops and animals and on the conditions of successful agriculture.

The scheme embraces not only the sending out of reading matter, but also the answering of questions by each student, and the correction of such answers by the University. Personal contact with the student is thus maintained, and he is invited to ask questions regarding local or community problems, or on any points in the lesson or in regard to the subject studied which are not quite clear to him.

Under the scheme the first two lessons are sent to the student as a beginning, and when he has returned the answers to the first lesson the third lesson is sent, and so on until completion of the series.

So far as possible the courses are arranged so that each may be taken independently and in any order which the needs of the student may suggest; but where students plan to take several courses of related subjects, certain sequences may be advised.

The particular feature is that a student may enter upon any course at any time and receive the lessons as rapidly as he is able to master them.

**Correspondence Study Clubs.**

Where ten or twelve regularly enrolled students residing in the same locality are pursuing a certain course, and find it of mutual value to organise a study club and hold meetings at regular intervals under the leadership of one of their members or other person, such clubs are recognised by the University, and are given every possible help that may contribute to their success.

If requested, the University will occasionally send an instructor to visit any well-organised study club in which attendance of members indicates sustained interest.

At present there are thirty courses offered, and others are being prepared. Those courses include corn culture, dairy husbandry, swine husbandry, sheep husbandry, poultry husbandry, fruitgrowing, canning and preserving, and the business aspects of Californian agriculture. The following are examples of correspondence courses:—

Course in Dairy Husbandry.—Seventeen lessons, including lessons on selection of herd, herd sire, pure-bred dairy cattle, care of the heifer from breeding to calving, feeding, testing, diseases, composition and secretion of milk, Babcock test, sources of milk and cream contamination, separating, market milk production, butter-making, cheese-making.

Course in Poultry Husbandry.—Sixteen lessons, including lessons on general characteristics, classification, selection for vigour, selecting and laying out plant, hatching with incubator, hatching with hens, brooding and rearing of chicks, brooder-houses and feeding of chicks, poultry-house essentials, feeds, feeding, breeding, meat production, marketing.

## GENERAL CONCLUSIONS.

A review of the foregoing and recent investigations in California show—

(*a*) That in America a Department of Agriculture is regarded as a very desirable department in a University, particularly in a State which is mainly dependent upon the primary industries.

(*b*) That the College of Agriculture should be the institution for the training of the agricultural experts of the State, and for those occupations on which a basic training in subjects pertaining to agriculture is desirable.

(*c*) That the courses should include both practical and theoretical work.

(*d*) That for the purposes of practical work an area of not less than 600 acres should be secured as an adjunct of a College of agriculture.

(*e*) That such area, if it cannot be actually part of the University domain, should be within convenient reach of the University; it should be possible to reach it in not more than forty-five minutes by conveyance.

(*f*) That agricultural experts consider it highly desirable that agricultural students should be in close touch with the University, so that they may be brought into direct contact with the University staff, with other students, and with University life generally.

(*g*) That special courses should be arranged for those who do not desire to enter a full degree course in agriculture.

(*h*) That the work of the Agricultural Extension Service—embracing the farm adviser, home demonstrations, home projects and correspondence tuition—is of very vital importance as an agency for the spread of agricultural education to persons who in ordinary circumstances would not have the opportunity of attending the University.

## AGRICULTURAL EDUCATION IN QUEENSLAND.

That the Queensland University should take a leading part in the development of agriculture in Queensland is an oft-told tale. A personal investigation into the work done for agriculture by American Universities, however, induces one not only to tell the tale once more but to tell it again and again until words, words, words are translated into action; until something is attempted—something is done.

In 1913 the first Chancellor of the University (His Excellency the late Sir William McGregor), in a comprehensive memorandum on the subject of a Faculty of Agriculture in the Queensland University (afterwards printed and presented to Parliament), stated that by a Faculty of Agriculture is meant a Department of the

University that would embrace in its scope systematic courses of lectures and demonstrations, and conduct original research on all that concerns the pastoral, farming, and horticultural industries. It should cover every product we obtain from the soil; and, as soon as may be practicable, should also include fisheries.

Sir William also commented upon the vastness of the promising field that Queensland presents for the practical application of modern science in regard to the great industries connected with the products of the soil, and the endless variety of subjects for research that already exist, and that must always present themselves over such a great area—more than five and a-half times that of the United Kingdom—with practically endless diversities of soil, climate, water, and flora. He emphasised that it was, therefore, very clear that the creation of a Faculty of Agriculture in the Queensland University was much needed, and that perhaps no other country presented such a vast and magnificent field for its operation.

In August, 1916, the following resolutions were carried by the Senate of the University of Queensland:—

(*a*) That, as the question of the primary industries is closely interwoven with post-war problems, and a good system of agricultural education will be helpful in the development and expansion of the primary industries of Queensland, it is desirable that agricultural education should be carefully organised and developed.

(*b*) That a select committee be appointed to inquire into the matter and furnish a report to the Senate.

The committee was duly constituted, and Mr. J. D. Story was appointed as chairman. In the course of its report the committee stated that in determining the main principles on which a comprehensive scheme of agricultural education should be based the following fundamental considerations must be kept in view:—

(*a*) That Queensland is essentially a State of primary industries.

(*b*) That her future prosperity depends largely upon the adequate and efficient development of the primary industries.

(*c*) That Queensland manufacturing agencies must perforce handle local raw goods, and hence the secondary industries cannot hope to prosper unless the primary industries are properly developed.

(*d*) That amongst the primary industries, agriculture stands pre-eminent.

(*e*) That it is from the primary industries that Australia will derive the greater part of her wealth; and, consequently, if the primary industries flourish, the huge burden of taxation, arising out of war loans and other loans, will be more easily met.

(*f*) That a right conception of true Australian citizenship should embrace a knowledge of the economic conditions which are essential to the welfare of the country, and that the important place which agriculture occupies in Australian economics should be clearly recognised.

(*g*) That those measures should be encouraged which tend to increase and popularise rural occupations, and thus not only lessen migration from country to town, but increase migration from town to country.

(*h*) That agricultural education is a matter for State and University concern rather than private concern; and that it should be closely interwoven with the State system and with University schemes, and should not be a detached and isolated branch of education.

The committee submitted definite recommendations as to the action which it thought should be taken regarding agricultural education in the Primary Schools, Rural Schools, Secondary Schools, and the University, and concluded its report with this significant paragraph:—

"That, as the adequate development of the primary industries is dependent upon those engaged in the industries securing a fair and reasonable return for the expenditure of their capital and labour, and as our youth would be more inclined to enter upon those industries if there were reasonable prospects (apart from seasonal uncertainties) of their earning a fair living thereby, it becomes apparent that the question of the financial return is closely allied to any scheme of agricultural education, and that the evolving by the responsible authority of a system whereby this reasonable financial return will be secured to the primary producers becomes more than ever a question of urgency, and that the University, through its Department of Economics or otherwise, should render as much assistance as possible in this matter."

## RECENT DEVELOPMENTS.

### Organisation of Producers.

Since that report was written the State has launched a scheme for the organisation of the agricultural industry, and there has been constituted—

(*a*) A Council of Agriculture.

(*b*) Nineteen District Councils.

(*c*) Seven hundred Local Producers' Associations, with a membership of over 20,000 producers.

A District Agent for each of the nineteen districts constituted under the scheme will shortly be appointed, and in the exercise of his duties he will be required—

(*a*) To act as secretary and administrative and advisory officer to the District Council.

(*b*) To endeavour to stimulate and sustain in the members an active interest in the Queensland Producers' Association.

(*c*) To ascertain the requirements of the district as a whole, and to assist in the preparation of definite programmes of work to be undertaken in each section of the industry.

(*d*) To act as markets officer for the district, and to collect data in regard to the movement of products, ruling market prices, and the supply of and demand for products at various points.

### Legislative Enactments.

Last session three important educational enactments were passed—

(1) "*The Agricultural Education Act of* 1922," making provision for the constitution of a Board of Agricultural Education and for the establishment of Agricultural Schools in districts where the people are prepared to contribute one-third of the initial cost of the site, buildings, and equipment.

(2) "*The University Site Act of* 1922," making provision for the enlargement of the University site at Victoria Park, and for other consequential purposes.

(3) "*The University of Queensland Act Amendment Act of* 1922," making provision for increased endowment. By this Act it is provided that in addition to a permanent annual endowment of £20,000 for general purposes, "whenever the Senate shall, after the passing of this Act, receive from public subscriptions or donations, or private bequests or benefactions, any capital sum or sums of money for the purpose of founding and awarding research fellowships in matters of research not provided for at the passing of this Act, or for the furtherance or encouragement of research in such matters, or for other like objects, the Governor in Council may pay to the Senate, by way of endowment on such sum or sums of money so received as aforesaid but subject to such terms and conditions as the Governor in Council on the recommendation of the Senate may determine, such sum or sums of money out of the consolidated revenue, which is hereby appropriated for the purpose, as the Governor in Council may think proper, but not exceeding in any one year the sum of £1 for every £1 so received on capital account as aforesaid nor a total sum of £10,000 in respect of all such endowments."

### University Activity.

Recognising that the time was opportune to further consider the question of agricultural education and as a result of his inquiries in California, Mr. J. D. Story recently submitted a memorandum on the subject to the Senate of the University, and the following resolutions were passed:—

(*a*) That a site of sufficient area for the practical work of a Faculty of Agriculture be secured as soon as possible.

(*b*) That, seeing that it is not practicable at the present time to establish a Faculty of Agriculture or a Department of Agriculture, steps be taken as soon as possible for the institution of a Diploma of Agriculture

(*c*) That a survey be made as to the directions in which the research work of the University could be extended, so as to include those matters of economic importance, to the primary industries and concerning which work is not being done by the Commonwealth Institute of Science and Industry, keeping in view—

(i.) The provisions of "*The University of Queensland Act Amendment Act of* 1922";

(ii.) The possibility of co-operation with the Council of Agriculture with a view to the Council's assisting financially in regard to research work which the Council might ask the University to undertake.

The matter of a site for practical work has since been met by the generosity of Dr. Mayne, who has made a gift to the University for agricultural purposes of a large area of land situated at Moggill, about 8 miles distant from Brisbane.

The questions relating to the establishment of a Diploma Course in Agriculture, and the survey as to the direction in which research work can be extended, are now in the hands of expert committees, who will report to the Senate in due course.

**Education Department's Assistance.**

At the suggestion of Mr. Story, the Minister for Education (Hon. J. Huxham) has recently initiated the home project scheme. Projects are actually in operation at several of the Rural Schools, and many teachers of primary schools situated in agricultural districts have written for detailed information regarding the working of the scheme.

It may reasonably be assumed, too, that action to establish Agricultural Schools under the Act of last session may develop, especially if the Government will appropriate certain funds each year for the establishment of such schools.

## CONCLUSION.

With these things already in train it may be in the best interests of agricultural education if a more or less definite policy can now be determined—a policy that will have for its objects—

(*a*) The awakening and retention of the interest of producers generally.

(*b*) Provision for scientific investigation of rural problems.

(*c*) Distribution of results of investigations and of known principles and processes, not only to students at schools and the University, but to as many as possible of the producers themselves.

A study of American methods suggests that any comprehensive policy of agricultural education should be made on the following assumptions:—

(1) That most of the boys so educated should take up the work of agricultural production.

(2) That a small percentage should pursue their studies in order to become experts or specialists in particular branches of agricultural science.

(3) That many of the boys who will take up such education will already have some knowledge of farm practice as practised on the home farm, and consequently the instruction required must consist largely of scientific principles upon which farm operations are based—a thorough knowledge of which will enable the student to apply those principles more intelligently.

(4) That any complete scheme should include, in addition to the ordinary school and college curricula, facilities for providing modern scientific information to those producers who desire to avail themselves of it, and to adults without farm experience who desire to take up farm work.

Accepting these assumptions as substantially correct, it will be necessary to have available for dissemination a fund of present-day agricultural information, complete in character and wholly applicable to Queensland conditions. Hence, as a starting point it may be necessary to complete a survey of the information available, and to have text-books or series of lessons prepared where the published information is either insufficient or unsuitable. When information of the right type is available schemes for its actual distribution may be definitely formulated.

## AGRICULTURAL TRAINING IN SCHOOLS.

Assuming again that basic information can be made available on the subjects of most importance to Queensland producers, the distribution of that information might be made through various grades of schools, as under.

### Primary Schools.

Curriculum to be much the same as at present, but with such modifications or amplifications as will permit of the teaching of rudimentary principles of agricultural science in country schools and the keeping of garden plots on a small scale to illustrate the principles taught.

### Rural Schools.

As opportunity offers, the Rural School system to be extended in suitable localities in preference to purely secondary school "tops." The work to be undertaken in such Rural Schools to include a course of two and a-half years in such branches of art, science, and craft, as will constitute a course in agriculture corresponding to the Junior University Course in general education or the Commercial Junior Course in commercial education.

### Agricultural Schools.

Agricultural Schools, as provided for in "*The Agricultural Education Act of* 1922," to be established in suitable localities; and a lead to be given by the establishment of one of these schools on the site at Zillmere as a demonstration or experiment school. The work to be undertaken in this school to include—

(1) A junior course as suggested for the Rural School.

(2) A senior course of two years which would constitute a course in agriculture corresponding to the Senior University Course of general education or the Commercial Senior Course of commercial education.

### Gatton College.

The Agricultural College at Gatton to be reorganised in accordance with the suggestions of the Departmental Advisory Committee recently appointed.

### University.

The University to establish an Agricultural Diploma Course bearing the same relation to agriculture as the Commercial Diploma Course bears to commerce, or the Engineering Diploma Course to engineering.

When conditions are favourable the University to consider the establishment of a Degree Course in agriculture as an extension of the Diploma Course.

So far as the Agricultural Schools are concerned, the number to be established must necessarily be limited, and they should only be established in such places where there seems to be a reasonable likelihood of their being permanently successful. Hence, as a preliminary step, there should be a survey by the Departments concerned regarding the places in which the establishment of these schools is fairly warranted.

To assist in the establishment of Agricultural Schools in localities where they are deemed necessary, consideration should be given to the desirableness of abolishing the one-third local contribution towards the cost of the site, building, and equipment of proposed schools, or at least to reduce the amount of the contribution to a proportion sufficient to prove the interest of the applicants.

Under such a scheme of agricultural education the progressive steps in the various schools might be as follows:—

(*a*) Entry to the Rural School to be on the satisfactory completion of the work of the Fifth Class in the Primary School. Students then to proceed with what might be termed an Agricultural Junior Course extending over two and a-half years, and embracing certain subjects of general education, manual training, and agricultural subjects.

All holders of two and a-half year Secondary School Scholarships to have the option of taking up the Ordinary Junior, the Commercial Junior, or, where instruction can be provided, the Agricultural Junior Course.

(*b*) Entry to the Senior Course at the Agricultural Schools to be on the satisfactory completion of the Junior Course. The Senior Course to comprise advanced work in general education (modified if necessary to meet the special requirements of agricultural students), manual training and farm practice, and agricultural science. Selection of courses having major work in one or more branches to be permitted.

(*c*) At the conclusion of the Senior Course a certain number of scholarships to be awarded on lines similar to the Open Scholarships to the University, to enable students to proceed to University Diploma Course work. The scholarships to be of (say) two and a-half years' duration—two years to be spent at the University, in a Science Course, and six months at an approved State or University experiment farm, or at an approved private farm.

## EXTENSION SERVICE.

In addition to the distribution of information through the ordinary school courses, an extension service might be developed by—

(1) Home project schemes for Rural School pupils and ex-pupils of Primary Schools where supervision can be arranged. There might be a Departmental Supervisor, and each principal of a Rural School (or other teacher of such school) might act as a divisional supervisor. The objects of the scheme to be to encourage work at the home in accordance with principles and processes enunciated by experts.

(2) Demonstration or field days at Rural Schools and Agricultural Schools, whereby the work in progress may be explained to parents and interested producers.

(3) Evening lectures in agricultural science where sufficient numbers of adults are desirous of instruction.

(4) Correspondence instruction in individual subjects or in groups of subjects for the benefit of producers who wish to take up agricultural studies but who cannot conveniently attend classes in those subjects.

It should be possible to organise this extension work through the Local Producers' Associations and other organisations of producers. The secretaries or officers of these associations should be the media through which all matters affecting agriculture may be brought suitably under the notice of producers in the locality.

## RESEARCH WORK.

In order to provide the most reliable information for instructional purposes, and to better provide for the solution of rural problems, there should be a definite move in connection with research work—both as regards purely scientific research and the discovery of economic processes for the treatment of agricultural products. The former class of work could most conveniently be done at the University, and agricultural organisations and others interested in the scientific investigation of rural problems should be continually urged to contribute to the funds of the University which are set aside for that purpose—any such contributions to be subsidised by the Government as provided by "*The University Act Amendment Act of* 1922."

The work involved in the investigation of special processes should be undertaken by the State Agricultural Chemist; and the Council of Agriculture, the State Trade Commissioner, and other bodies interested in the matter should contribute to the cost of such investigations and collaborate with the Agricultural Chemist in regard to the work to be undertaken. Such an arrangement would obviate undue duplication of staffs, buildings, and equipment, and would also obviate overlapping in effort on the part of the several bodies concerned.

The results of such experiments and of the work on experiment farms should be published in bulletin form, to be made available to Rural Schools, Agricultural Schools, and to any producer requiring them. The bulletins would also form a useful addition to the collection of Queensland agricultural information.

A practical and effective scheme of agricultural education is undoubtedly warranted in a land of primary production, such as Queensland. The Council of Agriculture, district councils, local producers' associations, and kindred organisations might assist in still further arousing the interest of producers to the necessity for strengthening this branch of education and of making good use of the facilities and opportunities which now exist for so doing. As a general rule, increased production will follow the efforts of well-trained producers; more profitable returns will surely follow a more highly organised agricultural industry. When these results are in process of achievement Queensland producers will then realise the true value of the watchwords—

**"EDUCATE AND ORGANISE."**

## SUGAR: FIELD REPORTS.

The Northern Field Assistant (Mr. E. H. Osborn) reports under date 5th May, 1923, to the Director of the Bureau of Sugar Experiment Stations as follows:—

### Bowen.

Exceedingly dry conditions prevailed in this area prior to my visit. Most of the growers had been attempting to keep the cane alive with the aid of their small pumping plants, but as the soil had not received any soaking during the normal wet season, the demand on these plants had been too much. The creeks and watercourses are all very dry and grass is very scarce at time of writing.

### Proserpine.

Up to date the mill's record showed the following very scanty rainfall:—January, 5.40; February, 2.64; March, 4.75; April (to 10th), .88—or a total of 13.67 inches. Considering such a dry period, the cane looked very fair, but unless more favourable weather conditions intervene very soon, the prospects for this season are anything but satisfactory. Parts of the district had suffered very severely prior to the fall of rain early in this month.

At Banana Pocket, some July planted Badila, Green Goru, and Clarke's Seedling, stood out on their own. Mr. Thomas was cutting a block of Badila for plants that would give a tonnage of about 30 tons to the acre now. Some very good first ratoon (cut October) 24 B (Green Goru) and Badila on Mr. J. Smith's farm also looked very well.

Some 800 acres of the area, probably half each of scrub and forest, had been sold, and was being vigorously opened up by the new owners. Many inquiries are being made about 1,200 acres that are yet available.

Some of the scrub land being cleared is of excellent quality carrying a good depth of rich deep black soil, and mostly timbered with dense vines and soft wood timbers, making grubbing an easy matter after a couple of trash fires have burnt out the majority of the stumps.

Tramway communication by means of the line to connect the Pocket with the Government Railway at Thompson's Creek is well advanced.

*Pests.*—In the course of a visit paid to Kelsey Creek it was seen that grubs (helped very probably by dry weather conditions) had done a considerable amount of damage to some first ratoons (Badila and Goru) situated on a couple of low-lying alluvial flats. Owners say that the infestation this year is the worst experienced so far.

The general state of the pasturage is very good in the Proserpine area, but no creeks or watercourses are running yet.

### Lower Burdekin.

The Pioneer and Kalamia areas were visited during the middle of April, the conditions at the time being woefully dry. The post office rainfall records at Ayr were:—January, .32; February, .12; March, .63; April (to 23rd), nil—or a total of 1 inch and 7 points. This scanty rainfall has necessitated continuous irrigation since the New Year. Such a constant drain upon the lagoons and underground waters has resulted in the water level being lowered in many places. Many fervent wishes were uttered by local growers for the Southern advocates of cheap sugar to have to put in such a season under similar conditions in the Burdekin area. Possibly, their views might change after a dry season or two. To make matters worse, the prospects of a large area of early planting for next year are remote, for to anyone a good strike means irrigating before planting, which is, naturally, a very expensive item to growers who have continually irrigated for the past three and a-half months. Moreover, nearly all the available water is required to keep the present crop alive until cutting time. Despite such bad conditions some very good irrigated cane was seen upon several farms. Probably, the cane on Dick's bank looks better as a whole than that on most of the areas. Some good Badila, H.Q. 426, N.G. 24, N.G. 24 B. and B. 208 were seen hereabouts. Several of these blocks had been manured with mixed manures, and looked very well indeed. Further away, on Mr. W. Payard's farm, a 15-acre block of April planted H.Q. 426 and 24 B. had been treated with 3 cwt. of mixed manure per acre, and was then being watered for the fourth time. This is a very good block of cane, some of the H.Q. 426 being of excellent growth. Mr. Payard green manures extensively, and out of a total of 34 acres, 12 acres have just been planted and look in splendid condition.

*Pests.*—Comment was made about the large quantity of beetles collected, principally adjacent to Plantation Creek. From inquiries it would seem that although grubs are quite bad enough, they are not very much worse than in previous years. Another pest doing a certain amount of damage to cane is the "white ant." One block of cane was spoken of as having had the misses planted up as many as three times, owing to damage caused by them. In a block of second ratoons at Jarvisfield (Badila) the writer saw among the stools many splendid looking sticks, but with dead tops. Upon investigation it was found that only the shell of the cane was left, the inside being completely eaten out from the bottom upwards, and where the inside was not quite destroyed the ants were there in great numbers.

*Tractor power.*—This has increased enormously in the Burdekin of late months. A large number are being used coupled up to 6-inch and even 8-inch pumps, and are giving great satisfaction in raising water for irrigation and ploughing purposes, more especially in ploughing over the irrigated ground quickly in order to plant up before the moisture gets away. Horse feed of all kinds is very scarce and difficult to obtain just now, and so the tractor again scores. At time of writing, the pasturage is very bad and all the swamps and holes are drying up rapidly.

**Home Hill.**

Only a very short visit was made to this part of the Burdekin, but the same dry conditions were prevailing there. Rather larger areas of land are, however, being irrigated, and planted for next year than were noticed on the other side of the river. Despite the gruelling times farmers are going through, some very fair crops of cane were noticed throughout the district. Some splendid standover Badila plant took the eye on Mr. V. Hansen's place, and some 25 acres of first ratoon H.Q. 426 and N.G. 24 looked very well on Messrs. Cannavan Brothers' considering the dry weather.

Manure had been used with these ratoons, and water, of course, kept up. Up the river some good crops were seen upon Messrs. Gibson, Horwood, and Stapleton's areas, respectively.

The former grower has one of the most uniform crops seen so far. He has 28 acres Plant H.Q. 426, N.G. 24, N.G. 24 B., which look good enough for a 40-ton crop, and some 20 acres of manured first ratoons that should run into a 25-ton crop.

Messrs. Stapleton and Horwood's crops are Badila, and, considering the backward state of the cane generally, show well.

Diseases.—Since my last visit to Home Hill, "top rot" has caused a certain amount of damage, and I am informed that in February certain blocks were rather badly affected, but in most effected a recovery as soon as water was laid on.

Weather conditions, although bad enough here, were rather better than Ayr, as the following figures to date (28th) show:—January, 1.93; February, .05; March, .10; April, 1.09—or a total of 3.19 inches. Nearly an inch fell on the 26th. Growers are very busy getting ready to plant, thankful even for this small relief.

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The Southern Field Assistant, Mr. J. C. Murray, reporting to the Director of the Bureau of Sugar Experiment Stations under date 1st May, 1923, remarks:—

**Eton.**

In common with other places around Mackay, in the early part of April, the Eton district was badly in need of rain. Cane was looking very parched and considerably checked, but none was beyond recovery if rain came within a reasonable time. Numbers of growers were busy ploughing, and a few were planting, taking the chance of an extended drought.

Cane varieties growing and showing fair resistance to dry weather conditions included Q. 970, Q. 813, H.Q. 426, H. 146, D. 1135, Shahjahanpur No. 10, H. 109, E.K. 1, and 7R 428 (Pompey). Of these canes it is probable that 7 R 428 (Pompey), Q. 813, and Shahjahanpur No. 10 will give the best ultimate results.

The question of green manures as a means of restoring humus, adding moisture, and giving improved texture to the soil is interesting the growers more than heretofore, and this, combined with subsoiling, will be a feature in future seasons, if carried out, in giving these loams far greater drought resisting properties than they have at present. Samples of soil were taken for analysis, from typical loams.

**Homebush.**

Generally speaking, the foregoing remarks on Eton would apply to the Homebush areas. The district was very dry at the time of visiting, although cane had not been checked beyond recovery. Deep cultivation is necessary here, and it is probable that maize ploughed under or grown for grain as a rotation would be beneficial.

Cane varieties that have apparently shown the greatest resistance to the drought so far are Pompey, Q. 813, D. 1135, and H.Q. 285. The first named variety is superior from a drought resisting point of view to the others and growers are recommended to try it.

**Sarina.**

This area is not quite so badly affected by the dry spell as many other places in the Mackay district. While there are blocks of badly checked cane, there are some farms on which good growth is being made, and where no serious checking is visible. A small amount of cane is affected with an unhealthy discolouration of the leaf, particularly D. 1135, but if the farmers observe careful plant selection, and in cases where the cane shows deterioration to change the variety, there is no occasion to suppose much cane will be affected. There is very little to comment on cane varieties since last visiting this area. H.Q. 426, Q. 813, and H.Q. 285 appear to be resisting the dry weather as well as is reasonably possible. The farmers here are recommended to change plants as much as they can, also to make a greater use of lime.

**St. Helens.**

The country between Hampden and St. Helens is, to a large extent, open forest, with considerable areas that would, if cleared, be accessible to the plough. The soil on the accessible portions of this tract is not rich, but a fair quantity is forest loam, heavily timbered with spotted gum, bloodwood, messmate, &c. This country is fairly well watered, with an average rainfall of about 60 inches. At the time of visiting, although there was a drought in Mackay, this area looked remarkably green, with plenty of fat stock in evidence.

**Yeppoon.**

A visit was made to this district for the purpose of giving settlers, if they required it, information as to the growing of cane in this area, and the milling facilities if any could be produced.

There is no cane being grown for sugar at Yeppoon just now, but from land that was inspected it is probable that 40,000 tons of cane could be produced annually. The greater part of the land capable of growing sugar was originally half forest and half scrub, but since the mill was shifted and cane growing lapsed some years ago, this has become covered with lantana. The average rainfall at Yeppoon is 60 inches. As far as could be seen there is nothing to prevent farmers from producing excellent cane in this district. Frost would be unlikely to seriously damage cane here. The farmers are advised to each plant, say, 5 acres of cane, and rail it to the nearest mill. Then, if their returns were favourable under the circumstances, and using them as a basis they might raise enough capital in the district to erect a mill capable of treating, say, 50,000 tons. It is probable that money spent in this way in the Yeppoon district would be well invested.

**Woongarra and Springfield.**

Good rains have fallen on these areas and the cane is again taking on a healthy, vigorous appearance. On the Woongarra areas there will probably not be a big crop, but there is every chance, with the open winter that promises, of a fair cutting. The cane for the greater part looks healthy, and is free from disease.

Varieties that are looking vigorous after the rain include Q. 1098, Q. 813, H.Q. 285, Shahjahanpur No. 10, E.K. 1, and 1900 Seedling. The Indian variety is making good headway in the estimation of numbers of farmers, and is looking healthy and vigorous. This cane is almost invariably affected with a harmless chlorosis which should not be confused with striped leaf disease. Careful observations of the last three years have proved it develops no secondary symptoms of "striped leaf."

At Springfield the farmers have a very fair chance of cutting a good crop. Their principal drawback here is haulage. A light tramline is badly needed. More green manuring is required here than is being carried out. The growers are also advised to experiment with lime and fertiliser. Q. 813 and 1900 Seedling are varieties that are looking well in this locality.

**Avondale.**

The prospects here are very favourable for a fair average season. The young plant cane is growing strongly, while the cane to be cut next season is doing well, and any that is taken off by next September should give a very fair yield. Q. 813 is doing remarkably well. M. 1900 and D. 1135 are also varieties that are making a fair showing. Up the river, at Tegege, there is very little cane at present, but the farmers are considering replanting. Varieties recommended to be tried are M. 1900, N.G. 24, Q. 813, H.Q. 285, E.K. 1, Q. 970, Q. 1098, and Shahjahanpur No. 10.

Summarising, the following would apply to the districts under review at Mackay—

*Eton District.*—Subsoiling and greater use of green manures. Greater amount of local experiment with fertilisers. Careful experiment with new varieties of cane.

*Homebush District.*—Greater amount of local experiment with fertiliser, as well as greater use of the facilities provided by the Bureau for soil analyses. Careful selection and changing of plants, subsoiling, and maize rotation.

*Sarina District.*—Greater use of lime. Careful selection of plants, and changing. More local experiment with fertilisers.

Generally speaking, the question of silos for the conservation of cane tops is one that ought to be considered by the farmers, especially those who have herds as well as sugar-cane.

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## CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report dated 15th May, 1923, from the Entomologist at Meringa, Mr. E. Jarvis:—

### SATISFACTORY PROGRESS OF EXPERIMENTS WITH PARA-DICHLOR. FOR CONTROL OF CANE-GRUBS.

**Plots at Greenhills.**

This experiment, which consists of half an acre of first ratoons (Badila) was treated on 16th February with ¼ oz. injections placed 1 foot apart, 2 inches from stools, and 4½ inches deep on each side of rows, the cane being about 4 feet 6 inches high at the time of application. Check plots were left on two sides of the treated area, all plots being twenty-four rows wide (two chains) in order that the cane from each might ultimately be conveniently harvested and weighed separately.

Seven weeks later (6th March) cane in the check plots began to show signs of grub affection, and ten stools when examined yielded from one to six grubs per stool (average 3.7). All grubs collected were feeding within about 4 inches of the surface, mostly among the cane roots, some having commenced to eat holes in the basal portion of sticks. Large patches of this yellowing grub-eaten cane occurred in both of the check plots, while in the fumigated area there was no sign whatever of grubs, the cane being uniformly green and normal in appearance. Ten stools, however (those appearing backward in growth), were examined in various parts of this treated plot, but although the soil was searched to a depth of 1 foot not a single grub could be found. On 9th April, a second examination of ten stools (five treated and five checks) gave similar results, viz.—an average of about three grubs per stool in the checks, and none in the treated area. The soil in the latter plot was still impregnated with the fumigant, the odour from which was quite noticeable in unbroken subsoil at a depth of 18 inches. About 1½ drachms of the ¼ oz. injections had evaporated during this interval of seven weeks, leaving half a drachm of each injection still operative in the soil. When last examined (seventeen days later) on 26th April, the cane throughout the treated area continued uniformly green and normal, the edge of the southern boundary of this plot contrasting quite noticeably in colour with the yellowing cane in a large grub-affected patch occurring in the adjoining check. At the present time (28th April) grub infestation at the corner of the block containing our experiment plots is mostly in patches of varying size, from 100 to 1,000 square feet, but as the season advances may extend more widely.

**Later Experiment at Greenhills.**

On the 11th instant, a small area of 66 feet by 25 feet, first ratoons Badila, damaged by third stage grubs of *albohirtum* was treated with ¼ oz. injections, placed 1 foot apart, about 4 inches deep, and close to stools, in order to obtain additional data with regard to the killing power of para-dichlor. under field conditions. During the fortnight following this application the weather happened to be rather showery, about 1.50 inches falling at Meringa between the dates 15th to 22nd April. Subsequent examination of these stools fifteen days after application yielded twenty grubs, eighteen of which were either dead or dying, only two being apparently unaffected. Several of the dead grubs, quite black and decomposed, were lying in hollows eaten into underground portions of canes, indicating that para-dichlor. probably exercises a paralysing effect, thus preventing the escape of grubs overtaken by the fumes.

**Plots at Meringa.**

The plots fumigated at Meringa on 25th January consist of first ratoons of D. 1135 growing on an area of volcanic soil usually infested each season. Injections of ¼ oz. of para-dichlor. were placed 6 inches deep, 4 inches from stools, and from 12 to 18 inches apart. The treated area of nearly half an acre consists of two strips 472 feet in length by 36 feet wide running along the summit of a ridge of high land that had been ploughed about 6 inches deep. The condition of the cane on these plots about a fortnight after injection was described in my February report (Australian Sugar Journal, vol. XV., p. 47, April, 1923). When next examined on 27th April (about three months after application) the cane, both on treated and check plots, was 7 to 8 feet high; but while the foliage of that on the fumigated area was dark green and of upright growth, the cane on adjoining check plots had turned more or less yellow in places owing to the presence of grubs. This was very marked on the strip where injections had been made 18 inches apart, which chanced to pass through grub-infested patches. Looking down on the plots from a height of 10 or 12 feet one could distinctly notice the green edges of the treated areas sharply bounded by the yellowing borders of the check plots. This occurred, of course, on portions where grubs happened to be working, but it was very encouraging to note that not a single yellow patch was present in the treated plots, which appeared of a uniform dark healthy green throughout their entire length.

**Introduction of Grub Parasites into Java.**

On the 28th of this month the first consignment of Queensland Scoliid digger-wasp parasites was forwarded to Professor S. Leefmans, Chief of Zoological Division, Institute for Plant Disease, and will leave Townsvills, 8th May. This package contained twelve cocoons of our digger-wasps *Campsomeris tasmaniensis* and *radula*, which being spun within the last ten days days should reach Buitenzorg before the wasps are ready to emerge from the cocoons. A second consignment more recently spun was forwarded on 1st May to catch the same boat, and these will be followed up by other lots until we succeed in introducing these parasites into Java, where it is hoped they may help to control the ravages of scarabæid grubs affecting cane and cassava crops, such as those of *Lepidiota stigma* Fad., *Leucopholis rorida* Fab., &c.

At the present time (2nd May) we have 190 paralysed grubs of albohirtum in our breeding trays, to which are attached either maggots or eggs of Campsomeris wasps in various stages of development.

In return for cocoons sent away we shall receive those of two species of scoliid parasites from Java for introduction into our canefields to wage war against grubs of the grey-back cane-beetle and of *Lepidiota frenchi*.

One of these wasps, *Dielis thoracica* F., attacks the grubs of four different scarabæid beetles. Its life-cycle occupies from forty-three to forty-eight days. In general it is confined to areas badly grub-infested in East Java and on the south coast of Sumatra, where it is found practically throughout the wet season and also during the dry monsoon of six months. In Java these wasps frequent honey-bearing flowers of the orders *Compositæ, Malacidæ*, &c., including those of genius sida, three species of which occur commonly around Meringa, and are habitually visited by our Campsomeris wasps.

**Visit to Lower Burdekin.**

Our inspection of the more serious cane pests of this district made last Month (March) was followed up—as promised to the canegrowers at Ayr—by a second visit undertaken on the 23rd instant, when field demonstrations regarding the use of carbon bisulphide as a soil fumigant for "white-ants" attacking cane, and its mode of application, were carried out by Mr. W. Cottrell-Dormer, my Entomological Assistant.

Owing to a continuance of dry weather many growers were unable to be present, being very busy irrigating their cane, but those who attended were well pleased with the results obtained by such fumigation.

Like most methods of control, prevention in this case is better than cure, as when termites have entered the sticks above ground level it is almost impossible to destroy them. The best time to treat this pest is shortly after planting, before the young shoots are more than 18 inches high. During this period of growth, any termites that may be in the soil will probably have discovered and surrounded the cane sets, and can then be killed by simply fumigating the rows with carbon bisulphides. This treatment should practically clean up the land, thus preventing any future attack on the standing crop. Since my recent visit to the Burdekin the value of para-dichlor. for destroying cane grubs has been clearly demonstrated by field experiments, and it would certainly be advisable to try its effect upon "white-ants." We have not yet worked out the possibilities of poison-baits in this connection, but such method of control might prove serviceable during certain periods in the life-cycle of this pest.

Another phase of control which I hope to investigate is that of treatment of the sets before planting with some palatable solution, non-poisonous to handle, but fatal or repellant to termites.

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## A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

*The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.*

### SOIL AND OTHER CHEMICAL ANALYSES—*continued.*

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following summary includes Series II.—the Mackay Soils, and a part of Series III.—Bundaberg Soils.

It will be noticed that the full chemical names of soil constituents are given in the first table. In the remaining tables, in order to save space and time, the chemical symbols are used, but the layman can easily make these out on reference to the first table.

The lime content is much better on the average in these series of soils than they were in Series I.—Cairns Soils.

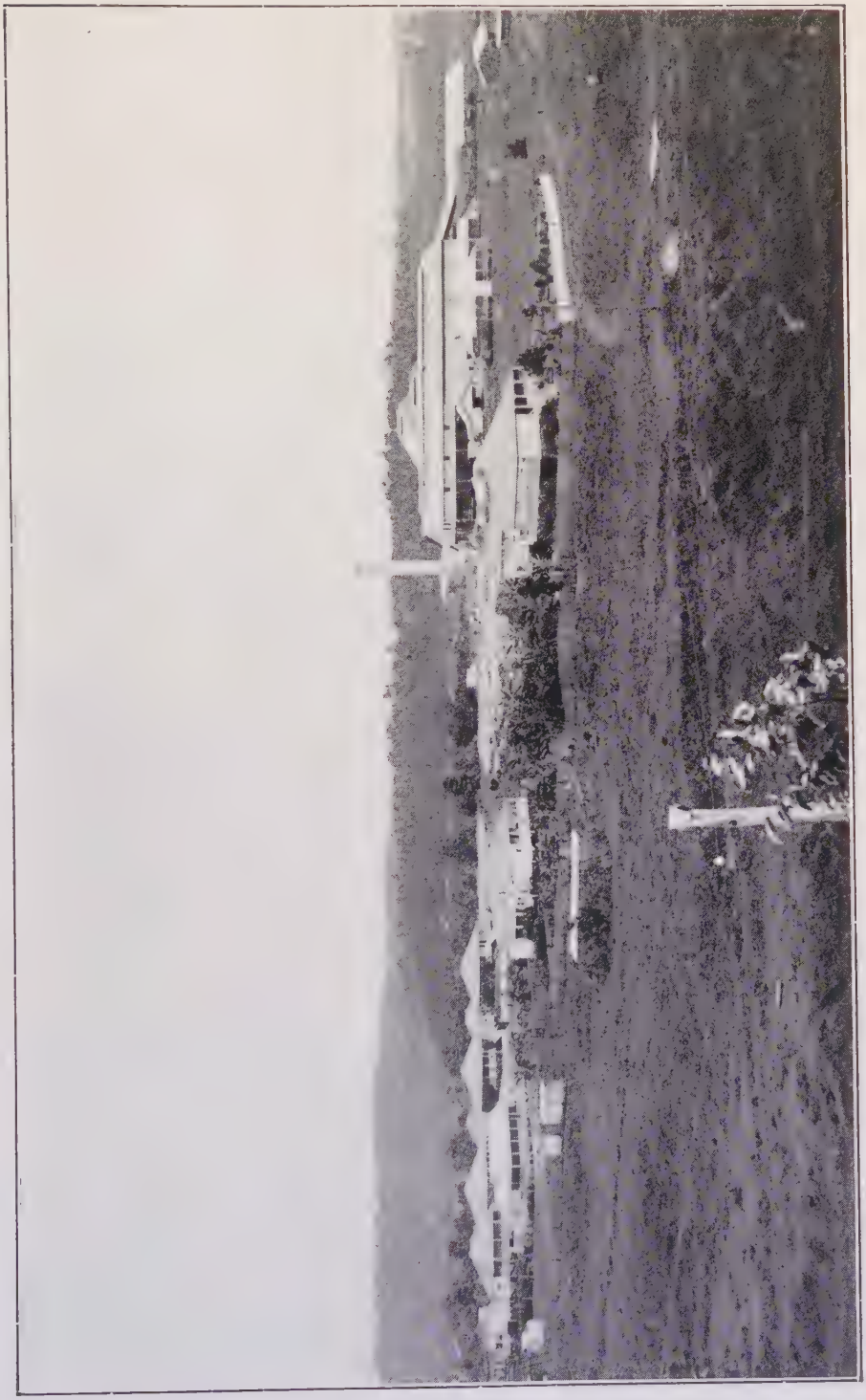

PLATE 109.—SOUTH JOHNSTONE CENTRAL SUGAR MILL.

SERIES No. II.

HOMEBUSH (MACKAY).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 86·85 | .. | .. | .. |
| Moisture .. .. .. | 1·35 | .. | .. | .. |
| Combustible matter .. .. | 4·25 | .. | 4·30 | .. |
| Silica ($SiO_2$) insoluble .. | .. | 78·71 | 69·29 | 72·41 |
| Silica ($SiO_2$) soluble .. .. | .. | 7·67 | 6·75 | 7·06 |
| Phosphoric acid ($P_2O_5$) .. | ·19 | ·10 | ·29 | ·30 |
| Chlorine (Cl.) .. .. .. | ·004 | .. | ·004 | ·004 |
| Iron Oxide ($Fe_2O_3$) .. .. | 3·78 | ·54 | 4·30 | 4·49 |
| Alumina ($Al_2O_3$) .. .. | 2·42 | 7·21 | 8·80 | 9·20 |
| Lime (CaO) .. .. .. | ·49 | ·84 | 1·24 | 1·29 |
| Magnesia (MgO) .. .. | ·24 | ·58 | ·75 | ·78 |
| Potash ($K_2O$) .. .. | ·16 | 1·72 | 1·68 | 1·75 |
| Soda ($Na_2O$) .. .. .. | ·24 | 2·23 | 2·21 | 2·31 |
| | 99·97 | 99·60 | 99·61 | 99·59 |

Acidic elements in the soils .. .. 79·77 per cent.

Basic elements in the soils .. .. .. 19·82 per cent.

Total nitrogen in the soils .. .. .. ·074 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0013 | 39 |
| Lime (CaO) .. .. .. .. .. .. | ·0591 | 1,773 |
| Potash ($K_2O$) .. .. .. .. .. | ·0182 | 546 |

RIVER BANKS (MACKAY).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 81·61 | .. | .. | .. |
| Moisture .. .. .. | 2·19 | .. | .. | .. |
| Combustible matter .. .. | 5·87 | .. | 5·94 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 72·35 | 60·38 | 64·22 |
| $SiO_2$ (soluble) .. .. | .. | 12·91 | 10·87 | 11·57 |
| $P_2O_5$ .. .. .. .. | ·14 | ·22 | ·33 | ·35 |
| Cl. .. .. .. .. | ·004 | .. | ·004 | ·004 |
| $Fe_2O_3$ .. .. .. .. | 3·76 | ·78 | 4·50 | 4·80 |
| $Al_2O_3$ .. .. .. .. | 4·95 | 8·71 | 12·37 | 13·16 |
| CaO .. .. .. .. | ·64 | ·68 | 1·22 | 1·30 |
| MgO .. .. .. .. | ·36 | ·31 | ·62 | ·65 |
| $K_2O$ .. .. .. .. | ·15 | 1·43 | 1·36 | 1·49 |
| $Na_2O$ .. .. .. .. | ·26 | 2·38 | 2·26 | 2·40 |
| | 99·93 | 99·77 | 99·85 | 99·94 |

Acidic elements in the soils .. .. 76·14 per cent.
Basic elements in the soils .. .. .. 23·80 per cent.
Total nitrogen in the soils .. .. .. ·093 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0014 | 42 |
| Lime (CaO) .. .. .. .. .. | ·0748 | 2,244 |
| Potash ($K_2O$) .. .. .. .. .. | ·0136 | 408 |

NORTH ETON.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 85·99 | .. | .. | .. |
| Moisture .. .. .. | 1·48 | .. | .. | .. |
| Combustible matter .. .. | 4·51 | .. | 4·58 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 75·25 | 65·68 | 68·82 |
| $SiO_2$ (soluble) .. .. | .. | 9·13 | 7·97 | 8·35 |
| $P_2O_5$ .. .. .. .. | ·12 | ·21 | ·31 | ·32 |
| Cl. .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 3·70 | ·96 | 4·60 | 4·82 |
| $Al_2O_3$ .. .. .. .. | 2·85 | 8·47 | 10·29 | 10·78 |
| CaO .. .. .. .. | ·63 | ·81 | 1·35 | 1·41 |
| MgO .. .. .. .. | ·27 | ·25 | ·50 | ·52 |
| $K_2O$ .. .. .. .. | ·20 | 1·85 | 1·82 | 1·90 |
| $Na_2O$ .. .. .. .. | ·27 | 3·38 | 3·23 | 3·38 |
| | 100·02 | 100·31 | 100·33 | 100·30 |

Acidic elements in the soils .. .. 77·49 per cent.
Basic elements in the soils .. .. .. 22·81 per cent.
Total nitrogen in the soils .. .. .. ·075 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0009 | 27 |
| Lime (CaO) .. .. .. .. .. | ·0760 | 2,280 |
| Potash ($K_2O$) .. .. .. .. .. .. | ·0200 | 600 |

PLANE CREEK (FOREST LANDS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 67·31 | .. | .. | .. |
| Moisture .. .. .. | 4·05 | .. | .. | .. |
| Combustible matter .. .. | 10·77 | .. | 11·23 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 71·18 | 49·93 | 56·21 |
| $SiO_2$ (soluble) .. .. | .. | 19·70 | 13·82 | 15·55 |
| $P_2O_5$ .. .. .. .. | ·08 | ·19 | ·22 | ·24 |
| Cl. .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 7·42 | 1·04 | 8·46 | 9·52 |
| $Al_2O_3$ .. .. .. .. | 8·71 | 5·12 | 12·67 | 14·26 |
| CaO .. .. .. .. | ·78 | ·42 | 1·11 | 1·24 |
| MgO .. .. .. .. | ·49 | ·34 | ·75 | ·84 |
| $K_2O$ .. .. .. .. | ·12 | ·36 | ·38 | ·40 |
| $Na_2O$ .. .. .. .. | ·27 | 2·12 | 1·77 | 1·99 |
| | 100·00 | 100·47 | 100·34 | 100·25 |

Acidic elements in the soils .. .. 72·00 per cent.
Basic elements in the soils .. .. .. 28·25 per cent.
Total nitrogen in the soils .. .. .. ·178 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0016 | 48 |
| Lime (CaO) .. .. .. .. .. | ·1433 | 4,299 |
| Potash ($K_2O$) .. .. .. .. .. | ·0101 | 303 |

PLANE CREEK (SCRUB LANDS AND LOW FLATS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble residue .. .. | 77·08 | .. | .. | .. |
| Moisture .. .. .. | 2·28 | .. | .. | .. |
| Combustible matter .. .. | 7·11 | .. | 7·28 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 75·23 | 59·34 | 63·98 |
| $SiO_2$ (soluble) .. .. | .. | 13·70 | 10·80 | 11·65 |
| $P_2O_5$ .. .. .. .. | ·11 | ·16 | ·23 | ·25 |
| Cl. .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 6·29 | 1·04 | 7·25 | 7·82 |
| $Al_2O_3$ .. .. .. .. | 4·83 | 7·25 | 10·66 | 11·50 |
| CaO .. .. .. .. | 1·43 | ·77 | 2·07 | 2·23 |
| MgO .. .. .. .. | ·57 | ·27 | ·80 | ·86 |
| $K_2O$ .. .. .. .. | ·15 | ·40 | ·47 | ·51 |
| $Na_2O$ .. .. .. .. | ·14 | 1·35 | 1·21 | 1·30 |
| | 99·99 | 100·17 | 100·11 | 100·10 |

Acidic elements in the soils .. .. 75·88 per cent.
Basic elements in the soils .. .. .. 24·22 per cent.
Total nitrogen in the soils .. .. .. ·130 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0014 | 42 |
| Lime (CaO) .. .. .. .. .. .. | ·1231 | 3,693 |
| Potash ($K_2O$) .. .. .. .. .. | ·0086 | 258 |

NORTH OF RIVER AND FARLEIGH.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. .. | 65·48 | .. | .. | .. |
| Moisture .. .. .. | 4·83 | .. | .. | .. |
| Combustible matter .. .. | 9·63 | .. | 10·11 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 61·97 | 42·61 | 47·31 |
| $SiO_2$ (soluble) .. .. | .. | 21·42 | 14·73 | 16·39 |
| $P_2O_5$ .. .. .. .. | ·29 | ·29 | ·50 | ·55 |
| Cl .. .. .. .. | ·01 | .. | ·01 | ·01 |
| $Fe_2O_3$ .. .. .. .. | 6·48 | 2·82 | 8·75 | 9·73 |
| $Al_2O_3$ .. .. .. .. | 10·49 | 8·59 | 16·92 | 18·83 |
| CaO .. .. .. .. | 1·26 | 1·21 | 2·16 | 2·40 |
| MgO .. .. .. .. | ·63 | ·34 | ·89 | ·99 |
| $K_2O$ .. .. .. .. | ·35 | ·70 | ·84 | ·94 |
| $Na_2O$ .. .. .. .. | ·38 | 2·81 | 2·33 | 2·60 |
| | 99·83 | 100·15 | 99·85 | 99·75 |

Acidic elements in the soils .. .. 64·26 per cent.
Basic elements in the soils .. .. .. 35·49 per cent.
Total nitrogen in the soils .. .. .. ·180 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0013 | 39 |
| Lime (CaO) .. .. .. .. .. | ·1456 | 4,368 |
| Potash ($K_2O$) .. .. .. .. .. | ·0241 | 723 |

SUNNYSIDE (MACKAY).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 80·14 | .. | .. | .. |
| Moisture .. .. .. | 2·33 | .. | .. | .. |
| Combustible matter .. .. | 6·40 | .. | 6·56 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 71·19 | 58·51 | 62·57 |
| $SiO_2$ (soluble) .. .. | .. | 13·22 | 10·80 | 11·58 |
| $P_2O_5$ .. .. .. .. | ·18 | ·14 | ·26 | ·28 |
| Cl .. .. .. .. | ·008 | .. | ·008 | ·008 |
| $Fe_2O_3$ .. .. .. .. | 2·97 | 1·86 | 4·60 | 4·88 |
| $Al_2O_3$ .. .. .. .. | 6·04 | 7·83 | 12·57 | 13·47 |
| CaO .. .. .. .. | ·88 | 1·08 | 1·78 | 1·91 |
| MgO .. .. .. .. | ·64 | ·71 | 1·22 | 1·31 |
| $K_2O$ .. .. .. .. | ·23 | ·96 | ·99 | 1·06 |
| $Na_2O$ .. .. .. .. | ·18 | 2·69 | 2·38 | 2·55 |
| | 99·99 | 99·68 | 99·67 | 99·61 |

Acidic elements in the soils .. .. 74·44 per cent.
Basic elements in the soils .. .. .. 25·17 per cent.
Total nitrogen in the soils .. .. .. ·170 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0011 | 33 |
| Lime (CaO) .. .. .. .. .. | ·0969 | 2,907 |
| Potash ($K_2O$) .. .. .. .. .. | ·0246 | 738 |

## PROSERPINE.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble residue .. .. | 75·52 | .. | .. | .. |
| Moisture .. .. .. | 2·53 | .. | .. | .. |
| Combustible matter .. .. | 8·23 | .. | 8·45 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 61·67 | 47·84 | 52·20 |
| $SiO_2$ (soluble) .. .. | .. | 18·37 | 14·10 | 15·42 |
| $P_2O_5$ .. .. .. .. | ·18 | ·13 | ·29 | ·31 |
| Cl .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 4·40 | 4·38 | 7·91 | 8·66 |
| $Al_2O_3$ .. .. .. .. | 7·32 | 7·67 | 13·45 | 14·70 |
| CaO .. .. .. .. | ·78 | 2·01 | 2·36 | 2·58 |
| MgO .. .. .. .. | ·70 | ·51 | 1·12 | 1·22 |
| $K_2O$ .. .. .. .. | ·17 | 2·07 | 1·80 | 2·01 |
| $Na_2O$ .. .. .. .. | ·15 | 3·11 | 2·60 | 2·82 |
| | 99·98 | 99·92 | 99·92 | 99·92 |

Acidic elements in the soils .. .. 67·93 per cent.
Basic elements in the soils .. .. .. 31·99 per cent.
Total nitrogen in the soils .. .. .. ·147 per cent.

### AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0011 | 33 |
| Lime (CaO) .. .. .. .. .. | ·1277 | 3,831 |
| Potash ($K_2O$) .. .. .. .. .. | ·0330 | 990 |

BURDEKIN.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 80·22 | .. | .. | .. |
| Moisture .. .. .. | 2·34 | .. | .. | .. |
| Combustible matter .. .. | 6·44 | .. | 6·60 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 70·11 | 57·62 | 61·67 |
| $SiO_2$ (soluble) .. .. | .. | 14·97 | 12·29 | 13·16 |
| $P_2O_5$ .. .. .. .. | ·18 | ·03 | ·22 | ·23 |
| Cl .. .. .. .. | ·004 | .. | ·004 | ·004 |
| $Fe_2O_3$ .. .. .. .. | 3·36 | 1·01 | 4·32 | 4·62 |
| $Al_2O_3$ .. .. .. .. | 5·15 | 8·68 | 12·41 | 13·28 |
| CaO .. .. .. .. | ·95 | ·73 | 1·58 | 1·69 |
| MgO .. .. .. .. | ·73 | ·39 | 1·31 | 1·14 |
| $K_2O$ .. .. .. .. | ·34 | 1·47 | 1·58 | 1·70 |
| $Na_2O$ .. .. .. .. | ·15 | 2·68 | 2·35 | 2·51 |
| | 99·86 | 100·07 | 100·28 | 100·00 |

Acidic elements in the soils .. .. 75·06 per cent.
Basic elements in the soils .. .. .. 24·94 per cent.
Total nitrogen in the soils .. .. .. ·107 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0078 | 234 |
| Lime (CaO) .. .. .. .. .. | ·1650 | 4,950 |
| Potash ($K_2O$) .. .. .. .. .. | ·0344 | 1,032 |

SERIES No. III.

ISIS (LEVEL LANDS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 55·51 | .. | .. | .. |
| Moisture .. .. .. | 2·85 | .. | .. | .. |
| Combustible matter .. .. | 11·39 | .. | 11·72 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 48·78 | 27·89 | 31·57 |
| $SiO_2$ (soluble) .. .. | .. | 40·13 | 22·91 | 25·95 |
| $P_2O_5$ .. .. .. .. | ·24 | ·23 | ·39 | ·45 |
| Cl. .. .. .. .. | ·004 | .. | ·004 | ·004 |
| $Fe_2O_3$ .. .. .. .. | 13·26 | 2·65 | 15·11 | 17·12 |
| $Al_2O_3$ .. .. .. .. | 15·76 | 6·56 | 19·98 | 22·63 |
| CaO .. .. .. .. | ·35 | ·17 | ·46 | ·53 |
| MgO .. .. .. .. | ·30 | ·19 | ·43 | ·49 |
| $K_2O$ .. .. .. .. | ·18 | ·23 | ·32 | ·36 |
| $Na_2O$ .. .. .. .. | ·11 | 1·24 | ·83 | ·94 |
| | 99·95 | 100·18 | 100·04 | 100·04 |

Acidic elements in the soils .. .. .. 57·97 per cent.

Basic elements in the soils .. .. .. 42·07 per cent.

Total nitrogen in the soils .. .. .. ·189 per cent.

AVAILABLE PLANT SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0011 | 39 |
| Lime (CaO) .. .. .. .. .. | ·1841 | 6,443 |
| Potash ($K_2O$) .. .. .. .. .. | ·0197 | 689 |

ISIS (HILLSIDES).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 46·29 | .. | .. | .. |
| Moisture .. .. .. | 2·96 | .. | .. | .. |
| Combustible matter .. .. | 12·74 | .. | 13·15 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 40·88 | 19·76 | 22·69 |
| $SiO_2$ (soluble) .. .. | .. | 45·98 | 21·71 | 25·05 |
| $P_2O_5$ .. .. .. .. | ·29 | ·16 | ·44 | ·50 |
| Cl .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 17·43 | 3·17 | 19·48 | 22·45 |
| $Al_2O_3$ .. .. .. .. | 19·04 | 7·51 | 23·24 | 26·77 |
| CaO .. .. .. .. | ·39 | ·20 | ·50 | ·57 |
| MgO .. .. .. .. | ·26 | ·28 | ·40 | ·46 |
| $K_2O$ .. .. .. .. | ·16 | ·20 | ·26 | ·30 |
| $Na_2O$ .. .. .. .. | ·09 | 1·42 | ·77 | ·88 |
| | 99·65 | 99·80 | 99·71 | 99·67 |

Acidic elements in the soils .. .. 48·24 per cent.
Basic elements in the soils .. .. .. 51·43 per cent.
Total nitrogen in the soils .. .. .. ·183 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0013 | 45 |
| Lime (CaO) .. .. .. .. .. | ·0842 | 2,947 |
| Potash ($K_2O$) .. .. .. .. .. | ·0161 | 563 |

## WOONGARRA.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 45·40 | .. | .. | .. |
| Moisture .. .. .. | 3·99 | .. | .. | .. |
| Combustible matter .. .. | 13·95 | .. | 14·52 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 32·71 | 15·51 | 18·13 |
| $SiO_2$ (soluble) .. .. | .. | 50·24 | 23·68 | 27·70 |
| $P_2O_5$ .. .. .. .. | ·40 | ·17 | ·50 | ·58 |
| Cl .. .. .. .. | ·005 | .. | ·005 | ·005 |
| $Fe_2O_3$ .. .. .. .. | 14·50 | 6·70 | 18·22 | 21·32 |
| $Al_2O_3$ .. .. .. .. | 20·61 | 8·61 | 25·46 | 29·78 |
| CaO .. .. .. .. | ·64 | ·27 | ·79 | ·93 |
| MgO .. .. .. .. | ·32 | ·22 | ·44 | ·51 |
| $K_2O$ .. .. .. .. | ·14 | ·26 | ·27 | ·31 |
| $Na_2O$ .. .. .. .. | ·12 | 1·01 | ·60 | ·69 |
| | 100·07 | 100·19 | 99·99 | 99·95 |

| | | |
|---|---|---|
| Acidic elements in the soils .. .. | 46·41 | per cent. |
| Basic elements in the soils .. .. .. | 53·54 | per cent. |
| Total nitrogen in the soils .. .. .. | ·221 | per cent. |

### AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0012 | 42 |
| Lime (CaO) .. .. .. .. .. | ·2554 | 8,939 |
| Potash ($K_2O$) .. .. .. .. .. | ·0234 | 819 |

BINGERA (RED SOILS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble residue .. .. | 69·21 | .. | .. | .. |
| Moisture .. .. .. | 1·96 | .. | .. | .. |
| Combustible matter .. .. | 8·39 | .. | 8·56 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 73·31 | 51·75 | 56·58 |
| $SiO_2$ (soluble) .. .. | .. | 21·13 | 14·92 | 16·31 |
| $P_2O_5$ .. .. .. .. | ·20 | ·13 | ·30 | ·33 |
| Cl .. .. .. .. | ·007 | .. | ·007 | ·007 |
| $Fe_2O_3$ .. .. .. .. | 6·55 | ·80 | 7·24 | 7·92 |
| $Al_2O_3$ .. .. .. .. | 12·84 | 3·24 | 15·39 | 16·82 |
| CaO .. .. .. .. | ·36 | ·20 | ·51 | ·56 |
| MgO .. .. .. .. | ·18 | ·23 | ·34 | ·37 |
| $K_2O$ .. .. .. .. | ·19 | ·20 | ·33 | ·36 |
| $Na_2O$ .. .. .. .. | ·11 | 1·13 | ·91 | 1·00 |
| | 100·00 | 100·37 | 100·26 | 100·26 |

Acidic elements in the soils .. .. .. 73·23 per cent.
Basic elements in the soils .. .. .. 27·03 per cent.
Total nitrogen in the soils .. .. .. ·137 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0017 | 51 |
| Lime (CaO) .. .. .. .. .. | ·1667 | 5,001 |
| Potash ($K_2O$) .. .. .. .. .. | ·0208 | 624 |

WATAWA.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble residue .. .. | 53·86 | .. | .. | .. |
| Moisture .. .. .. | 3·55 | .. | .. | .. |
| Combustible matter .. .. | 12·43 | .. | 12·87 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 76·14 | 42·33 | 48·59 |
| $SiO_2$ (soluble) .. .. | .. | 13·91 | 7·86 | 9·01 |
| $P_2O_5$ .. .. .. .. | ·19 | ·11 | ·25 | ·29 |
| Cl .. .. .. .. | ·002 | .. | ·002 | ·002 |
| $Fe_2O_3$ .. .. .. .. | 13·31 | 3·24 | 15·66 | 17·96 |
| $Al_2O_3$ .. .. .. .. | 15·50 | 3·89 | 18·28 | 20·98 |
| CaO .. .. .. .. | ·35 | ·27 | ·52 | ·59 |
| MgO .. .. .. .. | ·41 | ·22 | ·55 | ·66 |
| $K_2O$ .. .. .. .. | ·16 | ·28 | ·31 | ·36 |
| $Na_2O$ .. .. .. .. | ·09 | 1·90 | 1·15 | 1·32 |
| | 99·85 | 99·96 | 99·78 | 99·76 |

Acidic elements in the soils .. .. .. 57·89 per cent.

Basic elements in the soils .. .. .. 41·87 per cent.

Total nitrogen in the soils .. .. .. ·185 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0010 | 30 |
| Lime (CaO) .. .. .. .. .. | ·1279 | 3,837 |
| Potash ($K_2O$) .. .. .. .. .. .. | ·0207 | 621 |

GIN GIN (FOREST LANDS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 67·96 | .. | .. | .. |
| Moisture .. .. .. | 3·46 | .. | .. | .. |
| Combustible mattre .. .. | 8·71 | .. | 9·03 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 70·95 | 49·95 | 54·92 |
| $SiO_2$ (soluble) .. .. | .. | 16·11 | 11·34 | 12·47 |
| $P_2O_5$ .. .. .. .. | ·17 | ·03 | ·20 | ·22 |
| Cl .. .. .. .. | ·003 | .. | ·003 | ·003 |
| $Fe_2O_3$ .. .. .. .. | 7·93 | 2·39 | 9·89 | 10·88 |
| $Al_2O_3$ .. .. .. .. | 10·06 | 7·08 | 15·40 | 16·94 |
| CaO .. .. .. .. | ·68 | ·59 | 1·22 | 1·34 |
| MgO .. .. .. .. | ·56 | ·22 | ·73 | ·81 |
| $K_2O$ .. .. .. .. | ·18 | ·63 | ·63 | ·69 |
| $Na_2O$ .. .. .. .. | ·19 | 1·62 | 1·34 | 1·47 |
| | 99·90 | 99·62 | 99·73 | 99·74 |

Acidic elements in the soils .. .. 67·61 per cent.
Basic elements in the soils .. .. .. 32·13 per cent.
Total nitrogen in the soils .. .. .. ·126 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0015 | 45 |
| Lime (CaO) .. .. .. .. .. | ·1292 | 3,876 |
| Potash ($K_2O$) .. .. .. .. .. | ·0145 | 435 |

GIN GIN (RIVER FLATS).

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Insoluble matter .. .. | 74·59 | .. | .. | .. |
| Moisture .. .. .. | 3·09 | .. | .. | .. |
| Combustible matter .. .. | 7·33 | .. | 7·57 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 72·95 | 56·15 | 60·76 |
| $SiO_2$ (soluble) .. .. | .. | 10·19 | 7·84 | 8·49 |
| $P_2O_5$ .. .. .. .. | ·23 | ·06 | ·28 | ·30 |
| Cl .. .. .. .. | ·002 | .. | ·002 | ·002 |
| $Fe_2O_3$ .. .. .. .. | 5·59 | ·86 | 6·43 | 6·96 |
| $Al_2O_3$ .. .. .. .. | 6·84 | 11·15 | 15·64 | 16·92 |
| CaO .. .. .. .. | 1·01 | ·62 | 1·52 | 1·64 |
| MgO .. .. .. .. | ·76 | ·32 | 1·03 | 1·12 |
| $K_2O$ .. .. .. .. | ·34 | ·97 | 1·10 | 1·19 |
| $Na_2O$ .. .. .. .. | ·21 | 2·71 | 2·30 | 2·49 |
| | 99·99 | 99·83 | 99·86 | 99·87 |

Acidic elements in the soils .. .. 69·55 per cent.
Basic elements in the soils .. .. .. 30·32 per cent.
Total nitrogen in the soils .. .. .. ·150 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0091 | 273 |
| Lime (CaO) .. .. .. .. .. | ·1793 | 5,379 |
| Potash ($K_2O$) .. .. .. .. .. | ·0262 | 786 |

## BIRTHAMBA.

| Constituent Element. | Agricultural Analysis. | Insoluble Residue. | Absolute Analysis. | |
|---|---|---|---|---|
| | | Insoluble in Hydrochloric Acid. | Water-free Soil. | Mineral Matter. |
| | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Soluble matter .. .. | 74·29 | .. | .. | .. |
| Moisture .. .. .. | 1·13 | .. | .. | .. |
| Combustible matter .. .. | 7·85 | .. | 7·67 | .. |
| $SiO_2$ (insoluble) .. .. | .. | 76·52 | 57·49 | 62·26 |
| $SiO_2$ (soluble) .. .. | .. | 16·89 | 12·69 | 13·74 |
| $P_2O_5$ .. .. .. .. | ·21 | ·02 | ·22 | ·24 |
| Cl .. .. .. .. | ·004 | .. | ·004 | ·004 |
| $Fe_2O_3$ .. .. .. .. | 5·67 | 1·25 | 6·68 | 7·23 |
| $Al_2O_3$ .. .. .. .. | 10·26 | 4·13 | 13·48 | 14·60 |
| CaO .. .. .. .. | ·26 | ·19 | ·41 | ·44 |
| MgO .. .. .. .. | ·22 | ·17 | ·35 | ·36 |
| $K_2O$ .. .. .. .. | ·08 | ·22 | ·25 | ·27 |
| $Na_2O$ .. .. .. .. | ·08 | 1·15 | ·94 | 1·02 |
| | 100·05 | 100·54 | 100·18 | 100·16 |

Acidic elements in the soils .. .. 76·24 per cent.
Basic elements in the soils .. .. .. 23·92 per cent.
Total nitrogen in the soils .. .. .. ·149 per cent.

### AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

| | Per Cent. | Lbs. Per Acre. |
|---|---|---|
| Phosphoric acid ($P_2O_5$) .. .. .. .. | ·0005 | 15 |
| Lime (CaO) .. .. .. .. .. | ·1280 | 3,840 |
| Potash ($K_2O$) .. .. .. .. .. | ·0290 | 870 |

## PEST OF THE COTTON FIELDS.*

FIGHTING THE BOLL WEEVIL MENACE—FRESH STUDIES BY AMERICAN AUTHORITIES—THE CALCIUM ARSENATE METHOD OF DESTRUCTION.

At no time since the boll weevil first appeared in the United States has so much attention and systematic effort been given to its extermination as is now being devoted to that problem by the cotton-growing interests.

Thirty years ago the Mexican boll weevil crossed the southern border. Its advance was rapid. The Department of Agriculture records that before ten years had passed it was spreading at the rate of 5,640 square miles annually. From 1901 to 1911 the annual increase in the infested territory averaged 26,880 square miles. In 1916 it reached 71,800 square miles. At the end of 1921 over 600,000 square miles of territory had been affected by the boll weevil, or practically 85 per cent. of the cotton belt. The annual direct loss through non-production of cotton lint and seed is officially estimated at over £40,000,000. In 1921 more destruction was wrought on the cotton crop by the boll weevil than by any other pest. The damage was equivalent to one-third of the potential production.

Many attempts to combat the pest have been made by the Department of Agriculture and other interests. There is little doubt that the growers in many cases have not been enthusiastic about the matter when their crops seemed likely to be sufficiently large to bring about a fall in the price of cotton. A more far-sighted policy has, however, now commended itself, and as the result of elaborate experiments it has been established that the best means of eradicating the boll weevil is to dust the cotton plant at night with calcium arsenate. The dew becomes impregnated with arsenic, and the weevils are poisoned by drinking it. In the case of 237 farms the average yield per acre when dusted with calcium arsenate amounted to nearly 300 lb. of seed cotton more than the average yield from the undusted sections of the same farms.

The adult boll weevil is about one-fourth of an inch long, with a breadth of about one-third of the length. This measurement includes the snout, which is approximately half the length of the body. In colour it progresses from light-yellow to grey or nearly black. The illustration on this page is about five times the natural size. The

*a*—Boll weevil from above. *b*—Same from side, five times natural size.

boll weevil is generally most active from 9 a.m. to 5 p.m., during which period of the day 65 per cent. of its eggs are deposited. Nature assists in destroying the boll weevil, particularly in a hot dry season. Mortality during the winter also is very high.

Most energetic efforts are being made by the Government to induce the planters to adopt the calcium arsenate method. Several bulletins have been issued by the Department of Agriculture, while films have been made and are issued free of charge in order to instruct in the proper methods of poisoning and the results that can be produced.

Fresh studies of the influence of various factors in the control of the boll weevil are now being organised by the Department, and conferences of entomologists are taking place in Louisiana.

* "Times Trade and Engineering Supplement," 7th April, 1923.

Dusting machinery for the application of the poison has been placed on the market. The question of maintaining an adequate supply of calcium arsenate in the country has naturally been receiving close attention. The specifications recommended by the authorities at Washington are as follow:—

Arsenic pentoxide content not less than 40 per cent.

Water-soluble arsenic pentoxide not to exceed 0.75 per cent.

Density not less than 80 or more than 100 cubic inches per lb.

On the basis of the 1922 cotton acreage, if the planters used the minimum quantity recommended, about 500,000 tons of calcium arsenate (containing 200,000 tons of white arsenic) would be required. The prospects are that only a small fraction of that quantity of white arsenic will be available, and there appears to be little likelihood that any large new production of calcium arsenate in the United States will take place. Moreover, arsenic is already in keen request in many markets for use in fungicides and insecticides. Whilst white arsenic is not subject to import duty in the United States, calcium arsenate is dutiable at 25 per cent. *ad valorem*. A Bill is before Congress for the purpose of freeing it from duty.

The Indian Central Cotton Committee has recommended strict measures against the introduction of the boll weevil in shipments of American cotton. The committee points out that once introduced the boll weevil will be as deadly in India as it has been in America. It has been ascertained that fumigation with hydro-cyanic gas will kill the weevil, and that a simple and safe fumigation plant can be erected at no great cost. On the other hand, correspondence with commercial bodies, including the Mill Owners' Association and Chambers of Commerce, has shown that, for the present at any rate, it is quite feasible to restrict the importations of American cotton to a single Indian port (Bombay), thus greatly simplifying the fumigation arrangements.

## THE WORLD'S COTTON PRODUCTION.*

The following table shows the world's production and consumption of cotton from 1908-09 to 1922-23 (estimated) and European consumption for the same years. It will be seen that even with the increase in the last two years European consumption is only 70 per cent. of the pre-war average, while world consumption is almost back to normal.

WORLD COTTON PRODUCTION AND CONSUMPTION FOR THE YEARS INDICATED.
(IN BALES OF 478 LB. LINT.)

| Years. | World Production. | World Consumption. | European Consumption. |
|---|---|---|---|
| | Bales. | Bales. | Bales. |
| 1908-09 | 20,604,000 | 20,289,000 | 10,968,000 |
| 1909-10 | 16,988,000 | 19,164,000 | 10,295,000 |
| 1910-11 | 18,856,000 | 19,888,000 | 11,040,000 |
| 1911-12 | 22,247,000 | 21,534,000 | 11,998,000 |
| 1912-13 | 21,550,000 | 22,533,000 | 12,117,000 |
| 1913-14 | 22,612,000 | 22,199,000 | 12,029,000 |
| 1914-15 | 24,861,000 | 20,670,000 | 10,606,000 |
| 1915-16 | 18,461,000 | 21,978,000 | 10,878,000 |
| 1916-17 | 18,924,000 | 21,108,000 | 9,044,000 |
| 1917-18 | 18,141,000 | 18,515,000 | 6,621,000 |
| 1918-19 | 18,765,000 | 16,705,000 | 5,962,000 |
| 1919-20 | 20,219,000 | 19,300,000 | 7,699,000 |
| 1920-21 | 19,675,000 | 16,914,000 | 6,736,000 |
| 1921-22 | 14,741,000 | 20,047,000 | 7,771,000 |
| 1922-23 | 17,664,000 | 20,579,000 | 7,623,000 |
| Average 1908-09 to 1914-15 | 21,102,000 | .. | .. |
| Average 1908-09 to 1916-17 | .. | 21,040,000 | 10,996,000 |
| Average 1915-16 to 1920-21 | 19,031,000 | .. | .. |
| Average 1917-18 to 1920-21 | .. | 17,860,000 | 6,755,000 |
| Average 1921-22 to 1922-23 | 16,202,000 | 20,313,000 | 7,697,000 |

*Bureau of Foreign and Domestic Commerce, U.S.A., per "Textile World," 17th February, 1923.

METHOD OF ESTIMATING.

The consumption estimates covering 1922-23 are based upon reports submitted by Government representatives abroad, which gave the consumption in each country reported upon for the first four months of the season, 1st August to 1st December, 1922. From these consumption figures for the first four months estimates have been made for the entire year. Due consideration has been given to general economic conditions, as well as to special conditions affecting the textile industry in each country; and if some unforeseen change does not occur, it is believed that the totals given are approximately correct. Allowance has already been made for decreases in consumption in many of the countries during the remaining months of the season; but if the price of cotton should go so high as to cause a general curtailment of mill consumption, the quantities consumed for the remainder of the cotton year might fall off so sharply that the above totals would not be reached.

## THE WORLD'S COTTON CONSUMPTION.*

ESTIMATED CONSUMPTION—THE 1922-23 ESTIMATE.

The world's consumption of cotton during the years ended 31st July, 1921, 1922, and estimated consumption for the year ending 31st July, 1923, are shown by principal consuming countries in the following table:—

WORLD'S CONSUMPTION OF COTTON—1920-21, 1921-22, AND ESTIMATED CONSUMPTION IN 1922-23.

| Countries. | 1920–21. | 1921–22. | 1922–23. |
|---|---|---|---|
| | Bales. | Bales. | Bales. |
| United States .. .. .. | 4,906,000 | 5,904,000 | 6,400,000 |
| Europe— | | | |
| United Kingdom .. .. | 2,134,000 | 2,948,000 | 3,100,000 |
| Continent .. .. .. | 4,602,000 | 4,823,000 | 4,523,000 |
| India .. .. .. .. | 1,925,000 | 1,947,000 | 1,950,000 |
| Japan .. .. .. .. | 1,883,000 | 2,275,000 | 2,500,000 |
| All other .. .. .. .. | 1,464,000 | 2,150,000 | 2,106,000 |
| Total .. .. .. | 16,914,000 | 20,047,000 | 20,579,000 |

WORLD'S COTTON PRODUCTION FOR 1921-22 AND 1922-23, AND CONSUMPTION FOR 1922-23.
(IN BALES OF 478 LB. NET WEIGHT.)

| Countries. | Production 1921-22. | Production 1922-23. | CONSUMPTION 1922-23. | |
|---|---|---|---|---|
| | | | American. | All kinds. |
| | Bales. | Bales. | Bales. | Bales. |
| United States .. .. | 7,954,000 | ‡9,964,000 | 6,150,000 | 6,400,000 |
| Europe— | | | | |
| United Kingdom .. | .. | .. | 2,100,000 | 3,100,000 |
| Continent .. .. | .. | .. | 3,167,000 | 4,523,000 |
| British India .. .. .. | 3,360,000 | 3,750,000 | 20,000 | 1,950,000 |
| Egypt .. .. .. .. | 837,000 | 1,050,000 | .. | † |
| Japan .. .. .. .. | † | † | 600,000 | 2,500,000 |
| China .. .. .. .. | 1,175,000 | 1,500,000 | † | † |
| Brazil .. .. .. .. | 612,000 | 545,000 | .. | † |
| All other Countries .. .. | 803,000 | 855,000 | 275,000 | 2,106,000 |
| Total .. .. | 14,741,000 | 17,664,000 | 12,312,000 | 20,579,000 |

*Bureau of Foreign and Domestic Commerce, U.S.A., per "Textile World," 17th February, 1923.

†Included in all other countries.

‡Subject to revision when final ginning returns are received.

# FRUIT FLY INVESTIGATIONS.

*The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist at Stanthorpe, Mr. Hubert Jarvis, for the months of April and May, 1923, in relation to the fruit fly and other injurious insects.*

## FRUIT FLY.

### Field Observations.

During the whole of the month of April the adult fruit fly (*C. tryoni*) was seen but rarely in the orchards; its absence being accounted for by the continuous cold, south-easterly wind and misty rain, which set in on 2nd April, and obtained throughout this period. The larvæ, however, are still (24th May) to be met with in late apples and quinces, both on the trees and in the packing sheds. The last appearance of fruit fly in the orchard observed by me (resting on ripe quinces) was on 2nd May.

### Field Experiments.

(1) With a view to ascertaining how far (*i.e.*, through what depth of soil) the adult fruit fly will travel on emergence from the pupa, several experiments have been carried out in the field, and also in the Insectary. In the latter instance, fifty pupæ were used in each experiment. These were placed on 1 inch of sifted soil, in separate glass containers, and these were then filled with similar sifted soil, to varying depths (*i.e.*, from 3 to 15 inches). No fruit flies have emerged to date from any greater depth than 6 inches. Similar experiments have been arranged in the field. In this situation holes were dug in the soil to the required depth, and the pupæ placed in these, instead of the glass containers, and the area embraced in each experiment covered in with mosquito gauze.

(2) Experiments, bearing on the question of the wintering of the fruit fly in the orchards, have been undertaken, as follows:—

Traps have been placed in various localities, these traps containing both pupæ and maggot-infested fruit. In the case of the latter, this was placed on the surface of the soil, and covered in with gauze, the soil being previously loosened and cleared of weeds. The conditions thus afforded are, more or less, quite natural conditions, and should give the maggots contained in the fruit every opportunity to escape into the soil and pupate. The pupæ were placed in previously loosened soil, at similar depths to those in the Insectary, 100 pupæ being used instead of 50 in each experiment, and the traps covered as above. A quantity of maggot-infested fruit (quince) has been buried in the soil at depths from 6 to 18 inches. These traps will, it is proposed, be left until the spring, and periodically examined. These experiments should prove conclusively the possibility of the fruit fly over-wintering, or its inability to do so in this district.

### Seasonal Occurrence (May).

(1) *The Pupa.*—Many pupæ (fly chrysalises) have been found within the fruit (quinces and late apples, var. Rokewood). Both the quince and this variety of apple are of very hard consistency, and the fruit fly maggots have, therefore, difficulty in breaking down the tissue, in feeding, and so mature very slowly. Indeed, in many cases they find it impossible to escape from the fruit, and are so forced to pupate in some cavity within it. From these pupæ, the adult fruit flies often emerge where they occur, and, being unable to escape, die. I have, on cutting open Rokewood apples and quinces, recently found both living and dead fruit flies within, as well as pupæ. It is, of course, possible that a percentage of pupæ of those occurring in sheltered situations, such as in or under packing sheds, get through the winter and give rise to flies in the spring. This point we should be definitely able to decide when this present winter has elapsed. Meanwhile, every precaution should be taken by orchardists to insure—acting on the assumption that such will take place—that no opportunity be given to the fruit fly to over-winter in their packing sheds. In my last report I mentioned this possible danger, and must, again, very strongly emphasise the vital importance of a thorough "clean-up" of all sheds.

(2) *The Maggots.*—Although very late in the season, fruit fly maggots are still present in quinces and late apples in the Insectary; and also so in stored apples, throughout the district.

(NOTE.—We have this season already, here in Stanthorpe, experienced several sharp frosts; the lowest temperature recorded by me, so far, in the Insectary, was 25 degrees Fahr.)

(3) *The Fly—Hatchings.*—Twenty-four fruit flies (*C. tryoni*) hatched in the Insectary during the month of April, but only eighteen have emerged to date, in the month of May.

**Co-operation (New South Wales).**

Arrangements have been made by the Queensland Department of Agriculture whereby the New South Wales Officer, Mr. Inspector Lindsay, will co-operate with us in fruit fly investigations. Experiments similar to those we have in hand could be carried out also in New South Wales by that officer; this procedure would help in locating definitely the area in which the Queensland fruit fly over-winters in its pupa form—*i.e.*, presuming that this is its habit. We would also welcome a visit from the New South Wales Government Entomologist-in-Chief or his Assistant, when such experiments as we are carrying out could be shown him, and the matter of how persistence of "The Fly" is effected discussed.

**Over-Wintering of Fruit Fly.**

The question of the fruit fly wintering (or over-wintering) in the districts adjoining the Granite Belt, both those in New South Wales and Queensland, is an important one. The creation of a buffer area of 25 miles radius surrounding the Granite Belt, and all commercial fruit trees and native fruits (if any) within this area destroyed, has been suggested by a local resident, thus isolating the Granite Belt. Should we be able to prove that the fruit fly winters in fruit within this 25 mile area, and travels later thence into the Stanthorpe district, the establishing of such an area surrounding the district would be a very excellent scheme indeed, provided certain difficulties associated with its prosecution could be surmounted. If, on the other hand, we can prove that the fly does not travel by its own flight into the Stanthorpe district, and that our main danger is in imported fruit, and in our own lack of care in cleaning up our orchards and packing sheds, the need for this proposed *buffer area* will be a very debatable proposition. It is, of course, possible for the fruit fly to travel short distances, and it could, when once present in the district, easily travel from one orchard to another, and most likely does so, as many orchards are separated from those adjoining only by a fence or a narrow strip of grass or bushland.

As bearing on these questions, it is intended, during the winter months, to make excursions into the districts in New South Wales and Queensland, surrounding the Granite Belt, and then careful search will be made for the fruit fly in any of its stages in these districts within, say, a radius of 40 miles.

## OTHER INJURIOUS INSECTS.

**Codling Moth.**

The destructive caterpillar of this well-known moth has this season been unusually abundant, in spite of the care exercised by most orchardists in consecutive sprayings with arsenate of lead. The Codling Moth has, moreover, during the period, not only bestowed its attention on apples and pears, but also has been quite abundant in late peaches, plums, and quinces. I have, so far, not been successful in discovering here, in breeding experiments, any parasite of this moth. Throughout the district the larvæ are now to be found in packing sheds, between cases, within old papers, or in any such suitable harbourage. Fruit fly maggots and pupæ are also present in many sheds, in fruit and under piles of cases, and in all sorts of crevices and corners, and a systematic clean-up should be taken in hand before the spring by all orchardists. Owing to the loose and open structure of most packing sheds, adequate fumigation by cyanide gas is a very difficult matter indeed, but, where this is possible, it is undoubtedly the best means of destroying these pests. Failing this, a careful search

for larvæ and pupæ in every likely situation should be carried out, and when found they should be destroyed. Boiling water poured into cracks and crevices between boards should prove useful in the work of destruction. All cases and piles of case-timber should be shifted, and each case thoroughly scoured and cleaned. All fruit remaining in the sheds should be placed in some more or less airtight container, and fumigated either with bisulphide of carbon or with cyanide gas. Further, all dust and rubbish should be brushed up and burnt.

### Woolly Aphis.

Much interest is being taken in the experiments now being conducted in New Zealand, with the *Aphelinus* parasite of the Woolly Aphis, introduced into that country by Dr. R. J. Tillyard, M.A., in 1913. Application has been made to Dr. Tillyard for a consignment of this useful insect for the Stanthorpe district. It should prove (should we be successful in establishing it) of considerable importance in helping to control, as it has been done in New Zealand, so in this Granite Belt area also, the pest in question.

### Tomato Caterpillar.

On 4th May, a new and injurious caterpillar of the tomato was brought to my notice. This caterpillar, the larva of one of our small moths (Fam. Pyralidiæ) is, when full grown, not more than half an inch long; the head and first segment of the body are a shining brown-black, and the remaining segment of a greenish white colour. The chrysalis is about ⅜ inch in length, and golden brown in colour, and is enclosed in a web cocoon, formed by the caterpillar and covered with particles of soil and grass. To date no moths have emerged as is necessary for the identification of the insect. This caterpillar generally attacks the flower end of the tomato fruit, mining to and fro in its tissue, and avoiding carefully the liquid pulp which encases the seeds. I have found as many as three of these caterpillars in one tomato, and when even one or two are present the fruit is soon rendered unfit for market. This pest appears only to attack the late tomatoes, and, so far, I have only one record of its presence. Several tomato-growers have, however, told me that it has been noticed by them during the last few weeks. The discovery of this insect in association with the tomato may be regarded for the time being as only a casual local incident pertaining to the habits of a local insect, and to have, therefore, no economic significance.

## FUNGUS DISEASES.

### Tomato.

One or two tomato troubles, commonly found in the Granite Belt area, were submitted to Mr. Tryon, Government Entomologist and Vegetable Pathologist, for his report, and these troubles are common to most growers. I insert Mr. Tryon's report, which should be of interest to many.

"The tomato (5) fruits forwarded by Mr. H. Jarvis on behalf of Mr. E. Sewell, Applethorpe, exhibit two different kinds of disease.

"Dark-brown sunken areas, sometimes coalescing, immediately surrounding the fruit-stalk insertion. These are probably caused by a fungus that is found associated with them, and that occurs externally as a white flocculent substance. This fungus is evidently a species of *Dactylium*, and probably corresponds to a form of *D. lycopersici*, Plowright, described in the eighties of the last century as causing an affection of tomatoes still growing, being met with them in the United Kingdom. Its habit of occurring upon the under surface of the fruit is a noteworthy characteristic.

"Blossom-end Rot (Bacterial).—One of the five fruits exhibits a large brown bruise-like patch at the flower end, and the dead tissue to whose presence this patch is due is accompanied by the growth of several distinct fungi. These are probably, none of them, parasites, but have followed bacterial decay. However, at a stage of disease such as is manifested by the fruit sent, it is difficult to assign the primary agent to which the inception of the trouble is due.

"It is not easy to suggest a method of control for these diseases, other than consists in spraying the plants with some fungicides, such as Bordeaux Mixture rendered quite neutral prior to application. However, the former of the two mentioned, according to report, attacks one kind of tomato in preference to all others, and, should this be the Stanthorpe experience, profit may be taken from this fact. However, two of the specimens exhibit previous damage by some puncturing insect—*e.g.*, Green Bug (*Nezara*)—and the wound present may be a contributing factor in determining disease-presence.

"Advantage may be taken of this fact. Finally, when gathering the fruit already ripening, disease-affected tomatoes should be similarly collected and afterwards destroyed, lest otherwise if suffered to remain they prove centres of further infection."

# THE FUTURE OF THE SUGAR INDUSTRY.

## ANNOUNCEMENT OF FEDERAL POLICY.

**On Tuesday, 5th June, the Prime Minister of the Commonwealth (Hon. S. M. Bruce, M.C.), announced the Federal Sugar Policy at Brisbane. The Policy provides for a definite termination of the Sugar Agreement and a continuance of the existing embargo on black-grown sugar for a further period of two years, subject to conditions set out hereunder. Subjoined is a *precis* of the Prime Minister's remarks.**

### THE PRIME MINISTER'S ADDRESS.

Discussing Federal policy generally at a public meeting in Brisbane on Tuesday, 5th June, the Prime Minister (Hon. S. M. Bruce, M.C.) referred, *inter alia*, to the sugar industry and Federal policy in connection therewith. From the Prime Minister's announcement the following points are taken:—

It is impossible to deny or overlook the legitimate claim of an industry that pays £6,000,000 a year in wages to some 25,000 employees, and produces a crop worth up to £9,000,000 per annum. It ranks among the very largest primary producing interests of Australia in any or all of the States.

Economically, the sugar industry is of even greater importance to the nation than a superficial examination of trade statistics would indicate. For it should always be remembered that, if sugar were not produced in Australia, from £5,000,000 to £6,000,000 would have to be remitted each year to foreign countries, which buy, in return, scarcely any of our goods. During the Government control period just expiring, over £47,000,000 was thus kept and spent in Australia in respect of the locally grown tonnage.

The national or political significance of the industry is even more arresting to the mind. In this regard the sugar industry stands in a unique position in Australia—for it is the sole industry of any magnitude at all that has been successfully carried on in those far North Coastal lands that are of such strategic importance to the White Australia policy.

Looking at the map, observers will notice that the Northern Territory is practically in the same latitude as Cairns, Innisfail, Mossman, Herbert River, and other very large, closely settled sugar districts. Yet the Territory's white population is lower than it was thirty years ago, and the problem of developing it seems as difficult of solution as ever. On the other hand, the sugar districts mentioned have witnessed constant substantial increases in farms, settlement, commerce, and population. The Government is pleased to note that the record percentage increase in population during the last census period occurred in the Herbert River district—a purely sugar locality—and that large towns like Townsville, Cairns, and Mackay, and other smaller places are wholly or principally dependent upon sugar for their existence.

It is imperative that the far North should be developed and settled with the white race, so that prosperous, happy, healthy, thoroughly acclimatised citizens of British stock should be resident there in tens of thousands to justify to the world our moral right to this magnificent country, and to act as the first line of defence and the bulwark of our most cherished policy of White Australia.

The 1912 and 1920 Royal Commissions on sugar both freely recognised the obvious fact that the continuance of the sugar industry is bound up with the very existence of Australia as a nation.

There will not be another sugar agreement. The Government's proposals are designed simply to meet existing conditions in a manner which, it is hoped, will appeal to the instincts of business and fair play common to sugar interests, Southern manufacturers, and other sugar consumers. In formulating its plans, the Commonwealth Government has been faced with two important circumstances, which unavoidably dominated the situation.

First, that there will be in Australia at the end of the agreement on 30th June, 57,500 tons of Government sugar.

Second, that sugar, alone of our primary producing industries, has no outside market whereby this surplus could be sold without loss (by virtue of the fact that all competing sugar is produced by black labour, which is paid wages far below the standard prevailing in Australia).

The Government surplus cannot be sold until 30th September, 1923, and will meanwhile displace a similar quantity of the uncontrolled new season's sugar which the Queensland pool, if established, will require to finance. The future position as to stocks is thus:—

30th June, 1923, Government's surplus against 1923-24 crop, 57,500 tons.

| | |
|---|---|
| 1923-24 consumption .. .. .. .. | 280,000 |
| Less 1923-24 crop .. .. .. .. .. | 260,000 |
| Shortage in crop .. .. .. .. | 20,000 |

30th June, 1924.—Surplus against 1924-25 crop, 37,500 tons.

Against the surpluses of 57,000 and 37,500 tons respectively might be set the 17,500 tons normal carry-over stocks usually held in refineries.

If the recent beneficial rains improved the 1923-24 crop (already estimated at 260,000 tons), the surplus at June, 1924, would be correspondingly greater. The surplus of 37,500 tons would be a serious menace to the 1924-25 crop, if the latter equalled consumption, which was possible with the present acreage and good weather conditions, and the surplus would be increased if foreign imports were to be allowed to come in. Moreover, it was recognised that there would be a very considerable loss in storage costs and in the strength of the 57,500 tons surplus that would have to be carried during the next twelve months, and of the 37,500 tons or more that would be carried for portion of the 1924-25 season.

This dilemma can be escaped by the Commonwealth Government selling its surplus abroad, but that course would involve a loss of probably £6 or £7 per ton on 40,000 tons (the excess carry-over), equivalent to from £240,000 to £280,000.

After carefully viewing the situation from all angles, the Commonwealth Government is forced to the conclusion that it is responsible in some measure for the existing surplus sugar—as the surplus is a direct result of the greatly increased acreage and production brought about by the agreement fixing the price of raw sugar at £30 6s. 8d. per ton.

Under the circumstances, the Commonwealth Government will continue the existing embargo on black-grown sugar for a further period of two years, subject to the following conditions:—

(1) The industry to form a pool free from the control of the Commonwealth Government, and to buy raw sugar for the 1923-24 season at not more than £27 per ton of 94 net titre, f.o.b. mill.

(2) The pool to enter into negotiations with the Colonial Sugar Refining Company, Limited, and the Millaquin Sugar Company, Limited, for an agreement to refine and distribute the sugar on the lines of the existing refining agreements—the price for such services to be subject to the approval of the Commonwealth Government.

(3) The pool to provide sugar for the purpose of manufactured goods for export at a price equal to the current world's parity.

(4) A competent authority, upon which the Commonwealth Government shall be represented, to be appointed to determine the price at which sugar is to be supplied for the export trade.

(5) The price for raw sugar for the 1924-25 season to be determined after investigation by a tribunal, and to be based upon the cost of efficient production in reasonably good districts and under normal conditions; such price not to exceed £27 per ton.

(6) The tribunal (see clause 5) to have regard, in ascertaining the cost of production, to excessive wages (if any) paid in the sugar industry as compared with other primary industries, owing, say, to the pool's fixed price for raw sugar.

(7) The pool to give the public the full advantage of any reduction, including costs of refining and distribution, effected from time to time.

(8) Subject to the foregoing conditions, the Commonwealth agrees to continue the present prohibition of the importation of black-grown sugar, until 30th June, 1925, except

(*a*) As to the foreign sugar necessary—as determined by the competent authority—to meet any shortage in Australia; and

(*b*) As to any kind of sugar not available in Australia that may be required for special manufacturing processes.

It is to be distinctly understood that, under no circumstances, will the embargo be continued after 30th June, 1925. The present proposals of the Commonwealth will give the sugar industry time in which to organise, so as to be able to meet any violent fluctuations in the world's price of sugar which may occur after the embargo is lifted.

After June, 1925, the sugar industry will be protected against unfair competition by means of a Customs duty in the same way as every other industry is protected. This duty will be of an amount which will enable the industry to carry on at a reasonable profit when the price of black-grown sugar is normal. The industry must, however, during the period that is now granted to it, so organise itself as to be able to meet without assistance the difficulties which will arise in any period when the world's price for sugar reaches an abnormally low figure.

The Commonwealth's proposals will procure the following beneficial results:—

To consumers: Retail price will be reduced by at least ½d. per lb. early in October.

To manufacturers: (1) Sugar for home trade will at the same time be reduced by at least £5 per ton. (2) Sugar for export trade will be supplied from Australian stocks at actual world's parity in such a manner that manufacturers will not be at a disadvantage by not having freedom to import. (3) Foreign sugar necessary for special manufacturing processes will be allowed entry.

To sugar industry: (1) The huge surplus stocks will not now be a serious and unfair menace to the next two crops. (2) Stability and security will be guaranteed for the next two years. (3) Those two years will act as a breathing space, enabling the industry to organise carefully against any emergency that may arise thereafter. (4) The industry now definitely knows exactly where it stands in relation to the Commonwealth Government, the embargo, the tariff, and the future generally.

## CANEGROWERS' PROTEST AND ACTION BY THE STATE PREMIER.

The Hon. W. N. Gillies, interviewed with regard to the sugar position, stated that, in view of telegrams received from the North protesting against the Prime Minister's offer regarding sugar, the Premier (Hon. E. G. Theodore) had invited three members of the Australian Sugar Producers' Association and three members of the United Cane Growers' Association to meet him.

Arrangements had consequently been made for three members from each of these organisations to meet the Premier on Friday, 15th June.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR MAY, 1923.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | lb. | % | lb. | |
| Prim ... ... | Friesian ... | 4 April, 1923 | 1,350 | 3·4 | 53·40 | |
| College Cold Iron | Jersey .. | 23 April, ,, | 630 | 5·8 | 43·20 | |
| Charming Damsel | Ayrshire ... | 27 April, ,, | 714 | 4·1 | 34·34 | |
| Lady Loch II. ... | ,, ... | 26 April, ,, | 700 | 3·9 | 31·85 | |
| College Prima Donna | Friesian ... | 19 Mar., ,, | 690 | 3·6 | 28·80 | |
| Lute ... ... | Ayrshire ... | 26 April, ,, | 525 | 4·7 | 28·70 | |
| Lady Mitchell ... | Friesian ... | 1 May, ,, | 620 | 3·8 | 27·59 | |
| College Evening Glow | Jersey ... | 5 April, ,, | 540 | 4·2 | 26·70 | |
| Rainfall of Marinya | Ayrshire ... | 29 Mar., ,, | 630 | 3·8 | 25·80 | |
| Yarraview Village Belle | Guernsey ... | 19 Feb., ,, | 420 | 5·2 | 25·80 | |
| College Nita ... | Friesian ... | 5 April, ,, | 600 | 3·6 | 25·20 | |
| Bellona ... ... | Ayrshire ... | 30 Aug., 1922 | 420 | 4·7 | 23·10 | |
| Little Buttercup ... | Friesian ... | 3 Mar., 1923 | 570 | 3·4 | 22·50 | |
| Lady Peggy ... | Ayrshire ... | 18 Dec., 1922 | 480 | 4.0 | 22·20 | |
| Pretty Maid of Harelmar | ,, ... | 11 Sept., ,, | 420 | 4.3 | 21·00 | |
| Royal Mistress ... | ,, ... | 25 Nov., ,, | 480 | 3·7 | 20 70 | |
| Auntie's Lass ... | ,, ... | 18 April, 1923 | 390 | 4·4 | 20·10 | |
| College Mignon .. | Jersey ... | 22 Nov., 1922 | 390 | 4 4 | 20·10 | |
| College Sunrise ... | ,, ... | 8 Sept., ,, | 320 | 5·3 | 20·00 | |

# QUEENSLAND'S DAIRYING INDUSTRY.

## ANNUAL CONFERENCE AND EXHIBITION.

**In 1905 Queensland's Butter Production amounted to 20,320,000 lb. In 1913 it had risen to 35,200,000 lb. In 1921 it reached the high level of 60,200,000 lb., and yet the industry is only in its initial stages.**

**The Australian Market affords the best demand for Australian Dairy Products.**

**95 per cent. of the State's Butter Output is produced co-operatively.**

**The fact that at the great Islington Show Queensland Butter secured the highest honours is most satisfactory to all concerned.**

HON. W. N. GILLIES,
Minister for Agriculture and Stock.

The Annual Conference of Dairy and Cheese Factory Managers was held in Brisbane on 30th May.

*Attendance.*

Messrs. F. W. Uhlmann, Caboolture (president); J. J. Searl, Warwick (secretary); M. J. Wilkins, Toowoomba; D. Saxelby, Booval; W. S. Hartley and G. E. S. Raynor, South Burnett; R. Graham, Pittsworth; H. McDougall, Kin Kin; G. Newton, Nanango; J. Hunter, Gympie; E. Haworth, Eumundi; W. Schmidt, Caboolture; P. E. Peters, Talgai; A. L. Thomas, Greenmount; J. D. Denham, Greymare; H. T. Burton, Bonnie Mountain; B. C. Cumming, Cooroy; T. Green, Greenmount; W. A. Smith, Esk; E. Donald, Grantham; M. Morgensen, Kingaroy; F. Rutkin, Esk; L. W. Hind, Roma; F. W. Denny, Oakey; J. P. Duers, South Queensland Dairy Company; W. J. Egan, Gayndah; D. J. McCarthy, Warwick; E. M. Moloney, Clifton; A. C. Leikiss, Allora; D. Gamble, Biddeston; S. Duxbury, Pratten; J. W. Purcell, Greenmount; Jas. Reid, Laclagan; —. Hunt, Laidley.

The Minister for Agriculture and Stock (Hon. W. N. Gillies), the Director of Dairying (Mr. E. Graham) and other departmental officers, were also present. Following is a *precis* of the proceedings:—

### Presidential Address.

The president (Mr. F. W. Uhlmann), in his address, declared that last year was the most successful in the history of the association. He was satisfied that if the members of the association continued to take the same keen interest in the affairs of the association that they now were doing, they would achieve great things for the industry. (Applause.)

The financial statement showed a credit of £463, against £419 last year.

### Election of Officers.

Mr. D. Saxelby (manager of the Queensland Farmers' Factory at Booval) was elected president; Messrs. R. A. Wilkin and W. S. Hartley vice-presidents; Mr. J. J. Searl secretary; and Messrs. Uhlmann, Denning, Dewars, Graham, Wiltshire, Thomas, and Rutledge an executive committee.

Complimentary references were made to the way in which Mr. Uhlmann, who has held the office of president for several years, and the secretary had done their duties. In accordance with the practice of the conference, the retiring president remained in the chair.

PLATE 110.—MEMBERS OF THE BUTTER AND CHEESE FACTORY MANAGERS' CONFERENCE, BRISBANE, 1923.

*Left to Right—Back Row:* MESSRS. O'SHEA, W. A. SMITH, P. E. PETERS, A. C. LEIKISS, E. DONALD, FERRINGTON, D. GAMBLE, G. NEWTON, MCCOLM, D. J. MCCARTHY, L. W. HIND, MCGRATH.

*Centre Row:* MESSRS. E. M. MOLONEY, M. WALLACE, E. GRAHAM, F. W. UHLMANN, D. SAXELBY, J. J. SEARL, R. GRAHAM, M. J. WILKINS, W. S. HARTLEY.

*Front Row:* MESSRS. F. RUTKIN, G. E. S. RAYNOR, S. DUXBURY, J. REID, J. D. DENHAM, H. T. BURTON.

**Refrigerated Cream Waggons.**

A suggestion regarding the refrigerating of cream waggons on the railway was regarded as impracticable by a number of speakers.

Mr. Wilkins, however, favoured a trial of the proposed system, and the erection of cooling depôts at the stations, in so far as Darling Downs branch lines were concerned.

Mr. Saxelby moved that the Railway Department be asked to make a trial of insulated wagons for the carriage of cream over long distances.

The motion was agreed to without dissent.

**Uniform Payments.**

Mr. Newton (Nanango) introduced the subject of uniform payments and distribution of export surplus.

Mr. Saxelby said the Co-operative Dairy Factories' Association referred the matter to the Pool Committee.

Mr. Wilkins declared that the matter was a very serious one. The quicker a common-sense method of payment was evolved the better for everybody. He moved that the Co-operative Dairy Factories' Association again be asked to deal with the matter.

Mr. Hartley moved an amendment, expressing appreciation of the Downs Factories' Association's action in referring the matter to the Pool Committee, and asking the association to endeavour to secure a more satisfactory system of payment for cream.

The motion was carried.

## THE MINISTER'S SPEECH.

The Hon. W. N. Gillies (Minister for Agriculture) was cordially welcomed by the retiring president at this stage. He asked the Minister to open the fourth annual conference and show of the association.

Mr. Gillies spoke of the benefits of such conferences and shows. He was greatly gratified to know that 95 per cent. of Queensland butter was produced under the co-operative system. In that connection he desired to state that the Government intended to pass legislation to prevent the use of the word "co-operative" by companies which were of a proprietary character. The fact that Queensland butter scored the highest honours at the Islington show was a source of greatest satisfaction and encouragement to them all. The butter industry was only in its infancy in Queensland, for there was more room for expansion in it here than in all of the other States combined. In 1905 the quantity of butter produced in Queensland was 20,320,000 lb. In 1913 it had risen to 35,200,000 lb., and in 1921 it reached the high level of 60,200,000 lb. And yet it was only in its initial stages. There were three ways of dealing with one's fellows. The first way was to ignore them, the second to compete with them, and the third to co-operate with them. Co-operation and efficiency should be the twin watchword of the dairying industry. He was sure the farmers did not want charity, but they deserved a little assistance, and the Council of Agriculture would render that help that they so much needed. Herd testing could not be too earnestly or too frequently advocated, seeing the average production per cow in Queensland was only 150 lb. of butter per annum. Water and fodder conservation were national matters, for a drought affected everybody. Recent events had shown them how impossible it was to regulate oversea prices, and that the Australian market, where working men were higher paid than overseas, afforded the best demand for Australian dairy products. But they must endeavour to induce the Victorian and New South Wales producers to come more into line with the producers of Queensland. (Applause.)

The Minister read the result of the competitions at the show held in conjunction with the conference.

## SECOND DAY'S SESSION.

Papers on subjects of interest to those engaged in the dairying industry claimed the attention of delegates to the fourth annual conference of the Queensland Butter and Cheese Factory Managers' Association on 31st May. Mr. F. W. Uhlmann (retiring president) occupied the chair.

Mr. Hartley (manager of the South Burnett Co-operative Dairy Company) dealt with defects in cream, the probable causes of which were indicated and remedies for which were suggested.

Mr. M. Wallace (Commonwealth Dairy Branch) gave a long and interesting general résumé of the season's export operations. The paper showed a considerable falling off in last season's gradings, both of butter and cheese. Quality, however, had been more uniform.

In the course of the discussion which ensued reference was made to a cold storage scale upon which the Commonwealth officials were depending, and which was found to be faulty.

Mr. Wallace explained that the scale in question was examined several times by the inspector of weights and measures, and although the scale was satisfactory at the beginning of the day, it became erratic later. He never held up a box of butter because of a 2-oz. shortage.

The president suggested that the holding up of allegedly shortweight butter should be referred to the executive, and this was agreed to.

Mr. R. Winks (Department of Agriculture) detailed some of the results of butter-grading experiences. He stated that even the packing-paper was responsible for deterioration in quality.

Mr. J. G. McMillan (Commonwealth Dairy Branch) tackled problems revolving around cheesemaking.

Papers of a more or less technical character and discussions thereon absorbed the whole of the afternoon sitting.

Mr. G. H. E. Heers (Department of Agriculture) read an informative paper on the 1923 monthly butter competition. Mr. Heers complimented the exhibitors generally upon the texture of the butters which competed at the association's annual show, but declared that there still was a good deal of room for improvement as to finish. He also demonstrated with the aid of a butter-box his idea of perfect branding, and showed the difference between the popular and the proper method of wrapping butter-pats. Photographs showing good and faulty packing methods were produced.

Mr. Heers also submitted a table showing the results in the continuous butter competition, won at the present year's show by the Allora factory, Laidley being second, and Booval third. These details showed that Laidley led in flavour, Booval being second, and Allora third. Esk, Booval, Laidley, and Allora all tied for texture with 10 points. All of the factories but two scored the maximum for salting, all of them secured 25 points for colour, ten of them tied for finish, and Eumundi was top in packing, with Toowoomba half a point behind.

"Some Faults in Cheese Production from the Dairy to the Market" was the theme upon which Mr. R. M. K. Snell (State Instructor in Cheesemaking) discoursed.

Other papers were "Manufacture of Butter" (Mr. A. Sheehan), "The Cream Supply and the Grading of Cream at the Butter Factories" (Mr. F. J. Watson), "General Notes on the Manufacture and Export of Cheese" (Mr. R. A. Wilkin), and "Cream Grading" (Mr. C. McGrath).

The full text of the technical papers read at the Conference will be reproduced in the Journal.

## THE COMPETITIONS.

### RESULTS OF THE JUDGING.

One afternoon was set aside by the members of the conference to inspecting the exhibits in the various sections of cheese and butter competitions. These exhibits were on view in the show rooms of the Queensland Farmers' Co-operative Society in Turbot street. Mr. E. Graham, Director of Dairying, Department of Agriculture, who was one of the judges, attended the show and explained to the members the reasons which induced the decisions of the judging, and also furnished much information of an educative character. Keen interest was taken in his remarks and demonstrations.

The results of the competitions were as follows:—

### NOVEMBER TO MARCH TEST.

Box of butter to be taken from ordinary consignments of first grade brand during the months of November to March. First prize, £15 15s.; second, £5 5s. Scale of points for judging: Flavour, 60; salting, 5; colour, 5; finish, 5; packing, 5. Judge, Mr. Hears (Department of Agriculture).

Warwick Butter Co., Allora, 462 points .. .. .. .. 1
Queensland Farmers' Co-operative Dairy Co., Laidley, 461¾ points .. 2
Queensland Farmers' Co-operative Dairy Co., Booval, 461 points .. 3

Detailed results—

| — | Nov. | Dec. | Jan. | Feb. | Mar. | Totals. |
|---|---|---|---|---|---|---|
| Cooroy | 90½ | 91 | 91¼ | 92½ | 93 | 458¼ |
| Gympie | 91¾ | 87¾ | 90¼ | 90 | 92 | 451¾ |
| Esk | 92½ | 92½ | 92¼ | 90½ | 92 | 459¾ |
| Oakey | 89¾ | 89¾ | 90¼ | 88½ | 91½ | 449¾ |
| Logan and Albert | 92¼ | 90¾ | 92¼ | 90¼ | 91¾ | 457¾ |
| Kin Kin | 89¼ | 90¼ | 86¼ | 92 | 90 | 447¾ |
| Stanley River | 90¾ | 88¼ | 91 | 92 | 92 | 454 |
| Caboolture | 91¼ | 89 | 88 | 92 | 93 | 453¼ |
| Pomona | 90 | 90 | 91 | 89¼ | 90½ | 450¾ |
| Eumundi | 90¾ | 91 | 89 | 91 | 91 | 452¾ |
| Gayndah | 91 | 90 | 89 | 91¼ | 92 | 453¼ |
| Terror's Creek | 91 | 90¼ | 90 | 90 | 90¼ | 451½ |
| Bundaberg | 87 | 86¾ | 85¾ | 84½ | 86 | 430 |
| Maleny | 92¾ | 91¼ | 89½ | 91¾ | 91½ | 456¾ |
| Goombungee | 91 | 91½ | 87¾ | 89¾ | 89¾ | 449¾ |
| Nanango | 90 | 90¾ | 89½ | 92½ | 90 | 453 |
| Chinchilla | 86¾ | 89¾ | 90 | 89¼ | 87½ | 443¼ |
| Toowoomba | 90¼ | 91½ | 91½ | 92¼ | 92¼ | 457¾ |
| Dalby | 91 | 89¾ | 87¼ | 91¼ | 90¾ | 450 |
| Crow's Nest | 91¾ | 90¾ | 91½ | 91½ | 91½ | 457 |
| Kingston | 91½ | 91¼ | 92¼ | 92¼ | 92½ | 459¾ |
| South Burnett | 92¼ | 91 | 91¼ | 91¾ | 92¾ | 459 |
| Warwick | 91 | 89¼ | 91¼ | 92 | 90¾ | 454¼ |
| Allora | 93 | 91¾ | 93½ | 92 | 91¾ | 462 |
| Killarney | 89½ | 89¼ | 88¼ | 89¼ | 89¾ | 446 |
| Booval | 93 | 91¼ | 92 | 92 | 92¾ | 461 |
| Boonah | 92 | 91 | 92¾ | 92½ | 91 | 459½ |
| Grantham | 90½ | 91¼ | 92½ | 90¾ | 92 | 457 |
| Laidley | 92 | 93 | 91¾ | 93 | 92 | 461¾ |
| Kingaroy | 92¼ | 91¼ | 92½ | 91½ | 91½ | 459 |
| Biggenden | 90½ | 90½ | 92 | 91¾ | 91¾ | 456½ |
| Mundubbera | 92 | 88 | 90¾ | 92¾ | 91¼ | 454¾ |
| Roma | .. | 90¼ | 89 | 88 | 90 | .. |
| Clifton | 89¾ | 89 | 91½ | 92 | .. | .. |
| Wowan | .. | .. | 87¾ | 87¾ | 84¾ | .. |
| Gladstone | .. | .. | 87½ | 89 | 91¼ | .. |
| Rockhampton | .. | .. | 88¾ | 88¾ | .. | .. |

## CONTINUOUS CHEESE TEST.

Mr. McMillan (Commonwealth Butter Department) acted as judge. The results were—

| | |
|---|---|
| Pittsworth (P.), 92.7 points | 1 |
| Irongate, 90.8 points | 2 |
| Warwick (B.M.), 90.6 points | 3 |

The details were—

| Name of Factory. | Average Points for Five Months. |
|---|---|
| Pittsworth | 92·7 |
| Irongate | 90·8 |
| Warwick (B.M.) | 90·6 |
| Mount Sibley | 90·2 |
| Warwick (G.) | 90·0 |
| Warwick (E.V.) | 89·8 |
| Felton | 89·8 |
| Warwick (V.H.) | 89·8 |
| Biddeston | 89·7 |
| Warwick (T.) | 89·6 |
| Mount Tyson | 89·4 |
| Unity (G.J.) Downs Co-operative Dairy Company | 89·2 |
| Yargullen | 89·3 |
| Pittsworth (B.) | 89·2 |
| Ramsay | 89·0 |
| Southbrook | 89·0 |
| Unity (K.) Downs Co-operative Dairy Company, Limited | 88·9 |
| Pittsworth (E.) | 88·9 |
| Rocky Creek | 88·8 |
| Pittsworth (Y.) | 88·7 |
| Warwick (P.) | 88·6 |
| Warwick (L.J.S.) | 88·6 |
| Pittsworth (L.) | 88·4 |
| Pittsworth (T.) | 88·2 |
| Crosshill | 88·2 |
| Maclagan (Moola) | 88·2 |
| Etondale | 88·1 |
| Kelvinhaugh | 88·0 |
| Woodleigh | 87·8 |
| Unity (a) Downs Co-operative Dairy Company, Limited | 87·6 |
| Unity (H.V.) Downs Co-operative Dairy Company, Limited | 87·2 |
| Unity (J.) Downs Co-operative Dairy Company, Limited | 87·2 |
| Kooroongarra | 86·2 |
| Merrimac | 86·3 |
| Rosalie | 83·4 |

## BUTTER—THREE WEEKS' STORAGE.

Mr. E. Graham (Department of Agriculture) acted as judge. Salted butter packed for export.

| | |
|---|---|
| Queensland Co-operative Company (Booval), 93 points | 1 |
| Terror's Creek Company, 92 points | 2 |
| Nanango, 91½ points | 3 |

| —— | Flav. | Tex. | Salt. | Colour. | Finish. | Packing | Total. |
|---|---|---|---|---|---|---|---|
| Factory— | 60 | 20 | 5 | 5 | 5 | 5 | — |
| Nanango Dairy Company | 52½ | 19½ | 5 | 5 | 5 | 4½ | 91½ |
| Q.F. Company, Grantham | 50 | 19½ | 5 | 5 | 4¾ | 4¾ | 89 |
| Caboolture (C.C.C.) | 51 | 19½ | 5 | 5 | 5 | 5 | 90½ |
| Downs, Clifton | 52 | 19½ | 5 | 5 | 4¾ | 5 | 91¼ |
| Logan and Albert | 51 | 19½ | 5 | 5 | 4½ | 4¾ | 89¾ |
| Warwick, Allora | 52 | 19½ | 5 | 5 | 4¾ | 5 | 91¼ |

BUTTER—THREE WEEKS' STORAGE—*continued.*

| —— | Flav. | Tex. | Salt. | Colour. | Finish. | Packing. | Total. |
|---|---|---|---|---|---|---|---|
| Factory— | 60 | 20 | 5 | 5 | 5 | 5 | — |
| Q.F. Company, Booval .. .. | 53½ | 19½ | 5 | 5 | 5 | 5 | 93 |
| Gayndah Co-operative Dairy Co. .. | 49½ | 19½ | 5 | 4¾ | 4¾ | 4¾ | 88¼ |
| Warwick, Goondiwindi .. .. | 49 | 19½ | 5 | 5 | 4½ | 5 | 88 |
| Murgon .. .. .. .. | 52 | 19½ | 5 | 5 | 4¾ | 5 | 91¼ |
| Pomona (C.C.C.) .. .. .. | 51 | 19 | 5 | 5 | 4¾ | 5 | 89¾ |
| Terror's Creek .. .. .. | 53 | 19½ | 5 | 5 | 4½ | 5 | 92 |
| Downs (Dalby) .. .. .. | 51½ | 19½ | 5 | 5 | 4¾ | 4¾ | 90½ |
| Q.F. Company, Laidley .. .. | 51½ | 19½ | 5 | 5 | 5 | 5 | 91 |
| Port Curtis .. .. .. .. | 50 | 19½ | 5 | 5 | 4½ | 5 | 89 |
| Warwick (Mill Hill).. .. .. | 50½ | 19½ | 5 | 5 | 4½ | 4¾ | 89¼ |
| Eumundi (C.C.C.) .. .. .. | 50 | 19½ | 5 | 5 | 5 | 5 | 89½ |
| Q.F. Company, Boonah .. .. | 51½ | 19½ | 5 | 5 | 5 | 5 | 91 |
| Esk Co-operative Dairy Company | 52 | 19½ | 5 | 5 | 5 | 4¾ | 91¼ |
| Downs (Brook St.) .. .. .. | 49½ | 19½ | 5 | 5 | 4¾ | 4¾ | 88½ |
| Wide Bay, Cooroy .. .. .. | 50 | 19 | 5 | 4¾ | 4¾ | 5 | 88½ |
| Maryborough (Kingaroy) .. .. | 52 | 19½ | 5 | 5 | 4½ | 5 | 91 |

BUTTER—THIRTY DAYS' STORAGE.

Class No. 4. Judge, Mr. E. Graham (Department of Agriculture). Packed for export.

Queensland Farmers' Co-operative Company (Boonah), 93 points) .. 1

Logan and Albert Company, 92½ points .. .. .. .. .. 2

Nanango, 92¼ points .. .. .. .. .. .. .. 3

| —— | Flav. | Tex. | Salt. | Colour. | Finish. | Packing | Total. |
|---|---|---|---|---|---|---|---|
| Factory— | 60 | 20 | 5 | 5 | 5 | 5 | — |
| Wide Bay, Cooroy .. .. .. | 53 | 19½ | 5 | 5 | 4½ | 5 | 92 |
| Warwick, Texas .. .. .. | 53 | 19½ | 5 | 5 | 4½ | 5 | 92 |
| Q.F. Company, Booval .. .. | 53½ | 19½ | 5 | 5 | 5 | 5 | 93 |
| Nanango Dairy Company .. .. | 53½ | 19½ | 4¾ | 5 | 4¾ | 4¾ | 92¼ |
| Terror's Creek .. .. .. | 52½ | 19½ | 5 | 5 | 4¾ | 5 | 91¾ |
| Downs, Cressbrook .. .. .. | 51½ | 19½ | 5 | 5 | 4¾ | 5 | 90¾ |
| Caboolture (C.C.C.) .. .. | 51 | 19½ | 4¾ | 5 | 4¾ | 5 | 90 |
| Q.F. Company, Booval .. .. | 50½ | 19½ | 5 | 5 | 5 | 5 | 90 |
| Downs (Brook St.) .. .. .. | 52½ | 19½ | 5 | 5 | 4½ | 5 | 91½ |
| Pomona (C.C.C.) .. .. .. | 51½ | 19½ | 5 | 5 | 4½ | 4¾ | 90¼ |
| Oakey Dairy Company .. .. | 52 | 19½ | 5 | 5 | 4¾ | 5 | 91¼ |
| Gayndah .. .. .. .. | 51 | 19¾ | 4½ | 5 | 5 | 5 | 90¼ |
| Logan and Albert .. .. .. | 53½ | 19½ | 5 | 5 | 4¾ | 4¾ | 92½ |
| Warwick, Texas .. .. .. | 51½ | 19¼ | 5 | 5 | 4¾ | 5 | 90½ |
| Q.F. Company, Laidley .. .. | 50 | 19½ | 5 | 5 | 5 | 5 | 89½ |
| Maryborough, Kingaroy .. .. | 51 | 19½ | 5 | 5 | 4½ | 5 | 90 |
| Murgon .. .. .. .. | 50½ | 19½ | 4¾ | 5 | 4½ | 3½ | 87¾ |
| Eumundi (C.C.C.) .. .. .. | 50 | 19½ | 5 | 5 | 5 | 5 | 89½ |
| Downs, Clifton .. .. .. | 50 | 19½ | 5 | 5 | 4¾ | 4 | 88¼ |
| Warwick, Allora .. .. .. | 51 | 19½ | 5 | 5 | 4¾ | 4¾ | 90 |
| Port Curtis Co-operative Dairy Co. | 51½ | 19½ | 5 | 5 | 4¾ | 5 | 90¾ |
| Esk Co-operative Dairy Company | 51½ | 19½ | 4¾ | 5 | 4¾ | 5 | 90½ |
| Q.F. Company, Grantham .. | 52 | 19½ | 4¾ | 5 | 4¾ | 5 | 91 |
| Warwick .. .. .. .. | 49½ | 19¼ | 5 | 5 | 4½ | 5 | 88¼ |

## FRESH BUTTER.

Class No. 5. Judge, Mr. E. Graham (Department of Agriculture).

Caboolture (C.C.C.), 94¼ points .. .. .. .. .. .. 1
Esk Co-operative Company, 92 points .. .. .. .. .. 2
Queensland Farmers' Co-operative Company, 91½ points .. .. 3

The details were—

| — | Flav. | Tex. | Salt. | Colour. | Finish. | Packing. | Total. |
|---|---|---|---|---|---|---|---|
| Factory— | 60 | 20 | 5 | 5 | 5 | 5 | — |
| Logan and Albert .. .. .. | 51½ | 19½ | 5 | 5 | 4¾ | 4¾ | 90½ |
| Caboolture (C.C.C.) .. .. | 54½ | 20 | 4¾ | 5 | 5 | 5 | 94¼ |
| Q.F. Company, Booval .. .. | 52 | 19½ | 4¾ | 5 | 4½ | 5 | 90¾ |
| Warwick, Allora .. .. .. | 51 | 19½ | 5 | 5 | 4¾ | 5 | 90¼ |
| Murgon .. .. .. .. | 52 | 19½ | 4¾ | 5 | 4 | 5 | 90¼ |
| Downs, Crow's Nest .. .. | 52½ | 19½ | 5 | 5 | 4 | 4½ | 90½ |
| Q.F. Company, Laidley .. .. | 51¼ | 19½ | 4¾ | 4 | 4½ | 5 | 89 |
| Esk Co-operative Dairy Company | 53 | 19½ | 5 | 5 | 4½ | 5 | 92 |
| Nanango Dairy Company .. .. | 51½ | 19½ | 4½ | 5 | 4¾ | 5 | 90¼ |
| Q.F. Company, Boonah .. .. | 53 | 19½ | 5 | 4¾ | 4¾ | 4½ | 91½ |
| Downs, Clifton .. .. .. | 51¼ | 19½ | 5 | 4¾ | 4½ | 5 | 90 |
| Pomona (C.C.C.) .. .. .. | 47 | 19 | 5 | 5 | 4¼ | 5 | 85¼ |
| Warwick, Texas .. .. .. | 51½ | 19½ | 5 | 4½ | 4¾ | 4½ | 89¾ |
| Q.F. Company, Grantham .. | 52 | 19½ | 5 | 4¾ | 4¾ | 5 | 91 |
| Maryborough (Kingaroy) .. .. | 52 | 19½ | 4¾ | 5 | 4¾ | 5 | 91 |
| Eumundi (C.C.C.) .. .. .. | 51½ | 19 | 5 | 5 | 4¾ | 5 | 90¼ |
| Wide Bay, Cooroy .. .. .. | 51½ | 19 | 4½ | 4¾ | 4½ | 4¾ | 89 |
| Terror's Creek .. .. .. | 52½ | 19 | 5 | 5 | 4½ | 5 | 91 |

## TWO EXPORT CHEESES.

Class No. 6. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Downs (Unity, Warwick) .. .. | 45 | 25 | 13½ | 9½ | 93 |
| Greymare .. .. .. .. | 43 | 25 | 14 | 9 | 91 |
| Southbrook .. .. .. .. | 45 | 24½ | 13½ | 9½ | 92½ |
| Pittsworth .. .. .. .. | 45 | 24 | 13½ | 9½ | 92 |
| Mount Sibley .. .. .. .. | 42 | 25 | 15 | 9 | 91 |
| Downs (Unity, H.) .. .. .. | 44 | 24½ | 14 | 9½ | 92 |
| Gayndah .. .. .. .. | 43 | 25 | 14 | 8½ | 90½ |
| Pittsworth .. .. .. .. | 46 | 24½ | 14½ | 10 | 95 |
| Rosemount .. .. .. .. | 42 | 24½ | 14½ | 9 | 90 |
| Warwick (P.) .. .. .. .. | 42 | 25 | 14½ | 9 | 90½ |
| Rocky Creek .. .. .. .. | 41 | 24½ | 14½ | 9 | 90 |

## TWO MEDIUM CHEESES, UNDER ONE MONTH.

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Moola Co-operative Dairy Company .. | 43 | 24 | 14½ | 9½ | 91 |
| Rocky Creek .. .. .. .. | 41 | 24 | 14 | 9 | 88 |
| Gayndah (Byrnestown) .. .. | 44 | 25 | 14 | 9 | 92 |
| Warwick (Pratten) .. .. .. | 44 | 24½ | 14 | 9 | 91½ |
| Downs (Westbrook .. .. .. | 44 | 24½ | 14 | 10 | 92½ |
| Warwick (L.J.S.) .. .. .. | 45 | 25 | 14½ | 10 | 94½ |
| Downs (Jondaryan) .. .. .. | 45 | 24 | 14½ | 9½ | 93 |
| Downs (Hodgson Vale) .. .. | 44 | 25 | 14½ | 9½ | 93 |
| Pittsworth No. 1 .. .. .. | 45½ | 24½ | 13½ | 9½ | 93 |
| Warwick (Victoria Hill) .. .. | 43 | 24½ | 14½ | 9 | 91 |
| Woodleigh .. .. .. .. | 43 | 24 | 14½ | 9 | 90½ |
| Downs (Koondai) .. .. .. | 43 | 23½ | 14 | 9½ | 90 |
| Pittsworth No. 2 .. .. .. | 46½ | 25 | 14½ | 9 | 95 |
| Southbrook .. .. .. .. | 43 | 24½ | 14½ | 10 | 92 |
| Warwick (Boney Mountain) .. .. | 45 | 25 | 14½ | 9 | 93½ |
| Warwick (Greymare) .. .. .. | 43 | 24½ | 15 | 9 | 91½ |

## TWO MEDIUM CHEESES, OVER TWO MONTHS.

Class No. 8. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Pittsworth No. 1 .. .. .. | 46 | 25 | 15 | 9 | 95 |
| Downs (Hodgson Vale) .. .. | 42 | 25 | 14½ | 9½ | 91 |
| Gayndah (Byrnestown) .. .. | 44 | 24½ | 15 | 9 | 92½ |
| Downs (Koondai) .. .. .. | 45 | 25 | 14½ | 9½ | 94 |
| Warwick (Pratten) .. .. .. | 43 | 24½ | 14 | 8½ | 90 |
| Downs (Westbrook) .. .. .. | 44½ | 24½ | 14 | 10 | 93 |
| Warwick (L.J.S. ) .. .. .. | 44 | 24½ | 14½ | 9½ | 92½ |
| Downs (Jondaryan) .. .. .. | 44 | 25 | 14½ | 9½ | 93 |
| Pittsworth No. 2 .. .. .. | 45 | 25 | 13 | 9½ | 92½ |
| Warwick (Victoria Hill) .. .. | 42 | 24 | 13 | 8½ | 87½ |
| Woodleigh .. .. .. .. | 46 | 24 | 14½ | 9 | 93½ |
| Southbrook .. .. .. .. | 45 | 24 | 13½ | 9½ | 92 |

## TWO LOAF CHEESES, UNDER ONE MONTH.

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Downs (Hodgson Vale) .. .. | 44½ | 25 | 14½ | 9½ | 93½ |
| Woodleigh .. .. .. .. | 45 | 24 | 15 | 9 | 93 |
| Warwick (Victoria Hill) .. .. | 45 | 25 | 14½ | 9 | 93½ |
| Downs (Westbrook) .. .. .. | 44½ | 24 | 14½ | 10 | 93 |
| Downs (Jondaryan) .. .. .. | 44 | 24½ | 14½ | 10 | 93 |
| Pittsworth No. 1 .. .. .. | 44 | 25 | 14 | 9½ | 92½ |
| Downs (Koondai) .. .. .. | 44 | 23½ | 14½ | 9½ | 91½ |
| Rocky Creek .. .. .. .. | 42 | 24 | 14½ | 9 | 89½ |
| Warwick (Pratten) .. .. .. | 43 | 24½ | 14½ | 9 | 91 |
| Pittsworth No. 2 .. .. .. | 46 | 25 | 14½ | 9½ | 95 |
| Warwick (L.J.S.) .. .. .. | 46 | 24½ | 14½ | 9½ | 94½ |
| Gayndah .. .. .. .. | 43 | 24½ | 14½ | 9 | 91 |
| Southbrook .. .. .. .. | 43 | 25 | 15 | 10 | 93 |
| Warwick (Boney Mountain) .. .. | 43 | 25 | 14 | 9½ | 91½ |
| Warwick (Jondaryan) .. .. .. | 44½ | 25 | 15 | 9½ | 94 |

TWO LOAF CHEESES, OVER TWO MONTHS.

Class No. 10. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Downs (Hodgson Vale) | 43 | 25 | 14½ | 9½ | 92 |
| Pittsworth No. 2 | 45 | 25 | 13 | 9½ | 92½ |
| Warwick (Victoria Hill) | 42 | 24 | 13½ | 8½ | 88 |
| Downs (Westbrook) | 43 | 24½ | 13½ | 9½ | 90½ |
| Downs (Jondaryan) | 44 | 24 | 13½ | 9½ | 91 |
| Warwick (Pratten) | 44 | 24 | 14 | 9 | 91 |
| Downs (Koondai) | 43½ | 24½ | 14 | 9½ | 91½ |
| Pittsworth No. 2 | 44 | 24½ | 14 | 9½ | 92 |
| Woodleigh | 45½ | 24½ | 15 | 9½ | 94½ |
| Warwick (L.J.S.) | 45 | 25 | 14½ | 9½ | 94 |
| Gayndah | 43 | 24½ | 14½ | 9 | 91 |
| Southbrook | 45 | 24½ | 14 | 9½ | 93 |
| Warwick (Jondaryan) | 43 | 24 | 14½ | 9 | 90½ |

TWO MEDIUM CHEESES MADE FROM IMPASTEURISED MILK.

| Factory. | Flavour. | Texture. | Colour. | Finish. | Total. |
|---|---|---|---|---|---|
| Moola Co-operative Dairy Company | 44 | 24 | 14 | 10 | 92 |
| Pittsworth No. 4 | 44 | 24 | 14½ | 9½ | 92 |
| Warwick (L.J.S.) | 44 | 25 | 14½ | 9½ | 93 |
| Downs (Koondai) | 42 | 24 | 14½ | 9 | 89½ |
| Pittsworth No. 3 | 44 | 23½ | 14 | 9 | 90½ |
| Downs (Westbrook) | 43 | 25 | 14½ | 10 | 92½ |
| Downs (Jondaryan) | 43 | 24 | 14 | 9½ | 90½ |
| Warwick (Pratten) | 42½ | 24 | 14 | 9 | 89½ |
| Gayndah (Byrnestown) | 43 | 24 | 14½ | 8½ | 90 |
| Downs (Hodgson Vale) | 44 | 24½ | 14 | 9½ | 92 |
| Felton | 43½ | 25 | 15 | 10 | 93½ |
| Warwick (Greymare) | 43½ | 24½ | 14½ | 9 | 91½ |

## BUTTER GRADING.

*(Paper read by Mr. R. W. Winks, Chief State Grader, at the meeting of Butter and Cheese Factory Managers at Brisbane, 31st May, 1923.)*

Now that the system of grading dairy produce has been in operation for about seventeen years, sufficient time has elapsed to form an opinion as to its value or otherwise to the industry. Previous to the introduction of grading, complaints continually came from London as to the quality of our butter on arrival there. Butter purchased here as first class, when it reached its destination, has been described as "rank pastry" totally unfit for ordinary table use.

Naturally, leading provision merchants and butter importers declined to handle our butter in the circumstances. One large firm that failed for £60,000 attributed its insolvency to extensive dealings in Australian butter. That the examination by disinterested inspectors at this end has been a big factor in altering for the better such an unsatisfactory condition of affairs I think few people will deny.

That the grader is looked upon at times as a kind of dairy policeman of the over-officious class, unsympathetic and unreasonable, ever on the watch to penalise the manufacturer, is an unfortunate misapprehension, which, I trust, the following remarks will help to dispel. Knowing as I do the innumerable difficulties a factory manager has to contend with, particularly in summer, when, owing to adverse conditions, it is impossible to make a first-class article from a big percentage of the cream and milk coming to hand, it is unquestionably the duty of the grader to help him whenever possible. To do otherwise would not only be a heartless and unjust proceeding, but would be in direct opposition to the spirit of the regulations in this connection. Irate suppliers, some of them enough to drive the average man mad, a directorate not all it should be, insufficiently equipped factories, &c., aggregate a list of troubles more than enough without the addition of a grader unduly severe in his judgments, even if otherwise competent.

I hear a voice, "What about short weights?" The examiner here, both under the provisions of the Commerce Act and the State Act, has no option but to impound as short weight any butter below the quantity stated in the trade description, even if it be $\frac{1}{8}$ lb. only. This, I consider, when only a few boxes in a large consignment are found deficient to that extent, is too hard; and the fine, if any, should at least be in accordance with the offence. The cost of stripping the packages, and the consequent deterioration of the butter, also longer storage charges, should, I respectfully submit, meet the oversight. Oversight I call it, for the day has passed when butter was intentionally packed short weight. The installation of expensive and sensitive weighing machines, and the care generally taken in this direction at most factories, are evidence of this.

Nevertheless, I still advise, as hitherto, the packing of 56¼ lb. butter net in each box purporting to weigh 56 lb., even when stamped "bare weight." Before leaving the question I might add that short weights are frequently due to faulty packing and excessive free moisture. The reason for mention being so seldom made of the former in the grader's memoranda, and nothing deducted from the total score of points, is that the butter is often graded before it has been weighed, or weighed and returned to the boxes by the attendants at the Cold Stores without the grader having seen them.

Grading, briefly defined, is the classification of the various butters and cheese into the different qualities known to the trade—Choice, First, Second, Third, and Pastry Grade. A maximum points choice butter is practically superfine, but as the latter is supposed to be faultless, such as, say, the best show samples, it is deemed advisable not to use the superfine stamp, at present, at any rate, especially in the case of butter destined for oversea, or that which might be held a considerable time before consumption. In fixing the grade of the butter before him, as soon as the grader has smelt and tasted a sample—provided the manufacture and condition be not extremely faulty—he should know into what particular grade the butter should be placed; but as purchases now are made on its points value, an additional responsibility rests upon the official examiner. A point, either too low or too high, means a loss to the factory or the purchaser. To reach unanimity in arriving at a recognised standard when the graders are not always operating together takes some time. This difficulty it is claimed has been overcome. As half the total of points is awarded for flavour and aroma, it emphasises the importance of these features as compared with the rest. No matter how well a butter may be made, if it be stale or otherwise unpalatable, it will not be relished by the average consumer. On the other hand, a butter no matter how good its flavour, with a squashy or very spongy body, and showing a very cloudy or milky brine, should not be classified as first grade. Such butter would not keep, and at the first exposure to high temperatures would, as you are all aware, rapidly deteriorate. The excessive amount of casein eventually leads to fermentation, and if kept long enough to absolute rancidity. Hence a butter with a good firm body, free from excessive moisture, always appeals to the grader. I am aware that in some districts where butter with a low melting point is produced it is almost impossible to submit a butter perfect in this respect. Certainly cold storage helps to disguise the weakness. The graders, however, do not as a rule penalise such butter on that account, merely stating in their memos. "body weak." Some factories, where the conditions referred to do not obtain, not infrequently despatch butter before it has sufficiently firmed up. The body is technically known as "sticky," and the core shows badly on the trier. Doubtless, want of space at the factory is mainly responsible for consignments being despatched in such an immature state; and we are often in a similar position here. When the Hamilton Cold Stores are available there will be ample space for butter such as that above described being held for a day prior to examination.

With regard to mottle, the least objectionable of the faults in butter, except when the defect is very pronounced, or, worse still, streaky, a butter is rarely penalised. When that is considered necessary, and to draw attention to the fact, say, in the case of a butter worth 92 points, half a point above its true value might be given for flavour and half a point taken off for mottle. The scoring reading 42½—30—19½, thus avoiding the fraction in the total, and leaving the butter at what was considered its true value—viz., 92 points.

As to the cause of mottle, opinions are divided. It often happens that odd churnings from the same consignment are affected, while others show no traces of the defect. In the days when concussion churns were all the vogue, reworking was supposed to establish uniformity of colour, and since streak or mottle is rarely seen in unsalted butter, it was maintained by some that the bleaching was the result of partially dissolved salt and its unequal distribution. Yet with the combined churn and worker the trouble still exists more or less. May it not be possible that, where so many lots of cream of varying degrees of acidity, also creams of abnormally pale colour not being thoroughly mixed at the time of churning, might be in some way responsible?

The natural colour of Queensland butter is consistently good. Now and then very pale or bleached samples are met with, mostly due to innutritious food, and confined chiefly to unsalted lines of extremely low grade.

Occasionally complaints from dealers in the Southern States have been made as to Queensland butter being wood-tainted, presumably from unseasoned box timber. Comparatively green timber fresh from the saws undoubtedly would have this effect. The great majority of our factories, however, use only dry, clean timber. After carefully examining samples at this end, I believe that the peculiar turnipy flavour on the exterior of the butter in such cases is mainly due to inferior paper.

### BLUE MOULD.

The sawn timber from hoop-pine is often stained a bluish colour in places, developed in the log, and in the early days of the sawmilling industry was paid for as second class on that account. A fair amount of it is seen in the packages, but it appears to be perfectly innocuous if kept dry.

Excessive free moisture, saturation from the ice troughs in the wagon overflowing, or exposure to rain in transit, accelerate blue mould, which next attacks the wrapping, and later on the butter. In a word, dampness is the chief source of this trouble.

There is evidence that the boxes, paper, and nails are unsuitably stored at some factories. Nails in particular, badly rusted from exposure to the weather, when driven at an angle often penetrate the sides of the butter and damage it. All such articles should be kept so as to be as free as possible from detriment or contamination of any description.

In salting and finish, in the majority of cases, there is little to complain of. Markings on the boxes are as a whole satisfactory. These should always be legible and neatly affixed. Under existing conditions an advice card for both the Commonwealth and State graders should accompany each consignment. In the event of the produce being examined for interstate purposes, only the State card need be presented. This, however, is generally attended to by the agents when preparing their notices of intention to export. The cards properly to fill their purpose must be correctly filled in, corresponding in every detail with the markings on the boxes; otherwise they are worse than useless. They should be placed in the brackets for that purpose, or left where the officials who select the test boxes will have no difficulty in finding them. It frequently happens that a full wagon has to be emptied before the cards are found lying on the floor of the car. This entails considerable inconvenience and labour to the men concerned, and, as it is unnecessary, causes much bad language.

And now, gentlemen, in conclusion, I might say that we welcome each and every one of you—directors, suppliers, or anybody interested—to witness the grading operations at their or your convenience. You may not gain much knowledge, but you certainly will not lose any. You will at least have the satisfaction of seeing your butter compared with that of other factories. In fact, I am firmly of the opinion that every factory manager, and, if possible, his head butter-maker, should visit the grading rooms at least once during the season to compare notes. I know that at the time when this would be most desirable from an educational point of view this may be easier said than done. Granting that, however, if it could be managed, the couple of days occupied by the trip would be well spent. Moreover, I believe that it would improve your opinion of both grading and graders.

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## QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 21.

### THE MAIDEN'S BLUSH.

The Maiden's Blush (*Sloanea australis*) is a fairly well-known "scrub" tree. Its common name is somewhat indiscriminately used by bushmen to designate trees with a pink wood. This tree is fairly well marked in the field, although our photograph is not a very good illustration of its typical shape. Mostly the trees lean to one side. They frequently grow on stream sides and overhang the water. The barrel is frequently irregular, being channeled or angular in cross section; it is also frequently somewhat flanged at the base in the larger trees. The bark is mostly brown and with a more or less marked tendency to be scaly. The heart wood is pink or reddish when freshly cut, and so far has not been used extensively. Coppice shoots are often seen on the barrels of the trees and are often useful to the field botanist, as they show the shape of the leaves and thus aid in the determination of the species. The trees are found in coastal "scrubs" from Illawarra, New South Wales, to Atherton, North Queensland.

*Photo. by W. D. Francis.*]

PLATE 111.—THE MAIDEN'S BLUSH (*Sloanea australis*).
A tree on Tambourine Mountain.

*Photo. by Dept. Agriculture and Stock.*

PLATE 112.—THE MAIDEN'S BLUSH, showing a Flowering Twig.

(A) Showing lower side, and (B) Upper side of expanded capsule.

## DISEASES IN PLANTS ACT—NEW REGULATIONS.

Regulation No. 56 under "*The Diseases in Plants Act of* 1916," whereby the importation of certain fruits into the Stanthorpe Fruit District were restricted, has been rescinded, and a Regulation No. 57 has been issued in its place. This new regulation, which takes effect as from the 19th day of May, 1923, and shall remain in force until the 31st day of March, 1924, stipulates that the introduction of such fruits as apples, apricots, barberry, Brazilian cherry, cherry, citrons, custard apples, fig, gooseberry (Cape), granadilla, grape, guava, Kai apple, kumquat, lemon, lime, loquat, mandarin, mango, mulberry, nectarine, orange, paw-paw, passion fruit, peach, pear, persimmon, plum, and quince into that part of the State enclosed by the Southern Border and lines commencing at Cullendore Crossing on the border, passing through Silverwood, Mountside, and Granite Hill, and then due west through Gore to 151 degrees 30 minutes meridian; then south along the meridian to the border, from any district within which the common Queensland fruit fly, the spotted fruit fly, or the Mediterranean fruit fly are known to exist, is prohibited, unless such fruit has been in cold storage for a period of not less than twenty-one days at a temperature of not more than 35 degrees Fahr.

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## WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 32.

### *CLEOME ACULEATA.*

*Description.*—A small branching prickly herb, usually about 1 foot high, the young plants, stems, and leaf stalks clothed with a fine close glandular pubescence, the prickles (stipules) borne in pairs at the base of the leaves. Leaves dimorphic, those in the lower part of the plant on leaf stalks (petioles) of $\frac{3}{4}$–1 inch, composed of three leaflets; leaflets elliptic, $\frac{1}{4}$–$\frac{3}{4}$ inch long, the margins ciliolate with short hairs. Leaves on upper parts of stem near the flowers simple, sessile or very short petiolate (stalked). Flowers small, about $\frac{1}{4}$ inch across, greenish white. Stamens slender, six. Capsule torulose, green, finely striate, $1\frac{1}{2}$–$2\frac{1}{2}$ inches long; seeds numerous, cochleate (shaped like a snail's shell), longitudinally striate, and also marked here and there with rough, raised transverse lines.

*Distribution.*—A native of tropical America; a common naturalised weed in the East Indies and evidently introduced into tropical Queensland from either Java or Singapore. We first received specimens of the plant from Northern Queensland in 1904 when Mr. H. Newport sent in specimens as a weed in paddocks about Kamerunga.

Lately specimens have been sent in from Moolaba (Russell River) by the Rev. Norman Michael, and I have noticed it about Cairns during the past few years.

*Common Name.*—I know of no English name commonly applied to this weed.

*Botanical Name.*—*Cleome,* derivation doubtful, but generally believed to be a name applied by early Latin physicians to some herbaceous plant, though the exact species is not known to modern botanists.

*Eradication.*—*Cleome aculeata,* though it has been some time in the State, has not manifested itself as a bad weed and calls for no special method of eradication.

*Botanical Reference.*—*Cleome aculeata* Linn., Syst. Nat., 3, 232.

PLATE 113.—CLEOME ACUTEATA.

(A) Seed, natural size and enlarged.

## STUD STOCK STUDIES.

### BEST BREEDS OF PIGS FOR QUEENSLAND CONDITIONS.*

**British Black.**

This is the largest black-haired breed extant, and for a long time was known and used exclusively in the south-western counties of England.

The principal qualifications claimed for the British Black are: Ability to thrive under natural grazing conditions; its docility and extreme prolificness and capacity to mother its young; and the subsequent rapidity of growth and development of frame and flesh of the growing animals. These attributes combined make the breed a popular one in many parts of the globe.

In appearance the British Black pig is remarkable for its size, vigour, constitution, and characteristically large drooped ears, which together practically form a hood covering for the face and most of the snout. The skin is distinctly black, thin

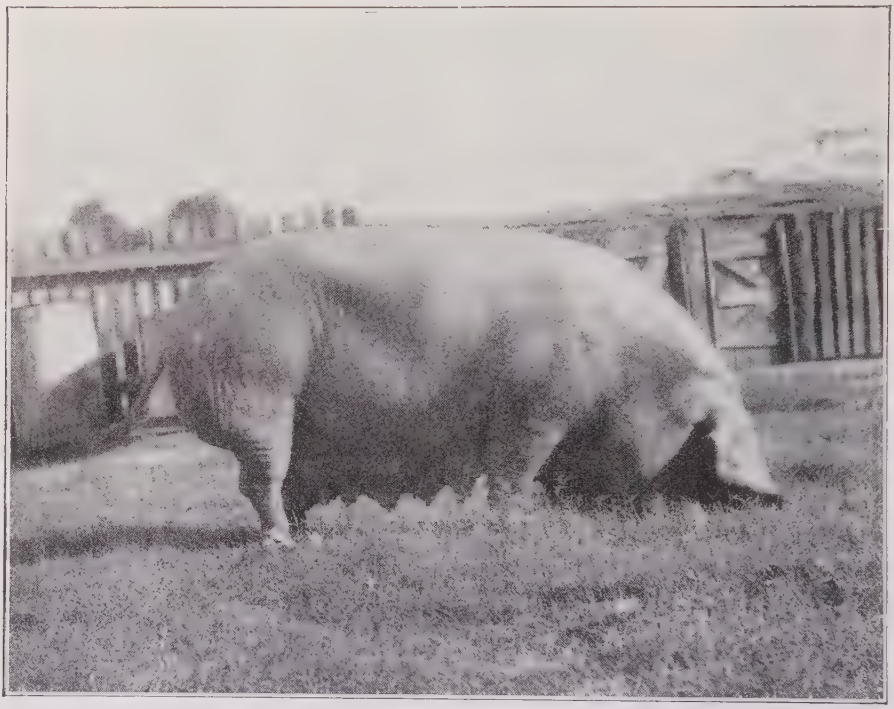

PLATE 114.—BRITISH BLACK SOW.

textured and supple, and grows a covering of rather fine hair. The pigment in the skin resists the scalding influence of the sun, a feature not to be disregarded in the selection of a breed of pigs to suit the existing climatic conditions of the warmer parts of this State.

The head is large, with prominent snout. Neck long and full, neatly set on to oblique shoulders, and tapering towards the under jaw. Body long, level, and deep, with well-sprung ribs; full, well-rounded loin, and deep sides. Quarters long, somewhat drooping, and with well set-on tail; hams full, and well let down. Legs straight, strong-jointed, with stout bone.

The brood sows are roomy, and possess exceptional capacity for the production and rearing of large litters, which ordinarily range from ten to twelve in number.

Further comment concerning this breed, and its value for cross-breeding purposes, is made elsewhere under the heading of "Cross-breeding for the Production of Pork and Bacon."

*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Department of Agriculture and Stock, Queensland, October 1922.

**Selection of Breeding Stock.**

*The Boar.*—A matter of paramount importance is the selection of the boar. On no account should anything other than a pure-bred animal be chosen. Certain characteristics are indispensable, and these must be kept foremost in mind when seeking an animal which is capable of exercising such an influence for good or harm in the herd. In pig-breeding, as in the case of raising other domesticated animals, certain families or strains of blood stand out prominently because of their proven superiority to other representatives of the same breed, a circumstance attributable no doubt to the careful selection exercised by studmasters in employing animals of proper type, conformation, and unquestionable prepotency; factors which cannot be ignored when selecting animals for use in establishing, maintaining, and improving a herd.

Emphasis of the superiority of some families in this direction may be reiterated, because experience has shown that the ability to beget or give birth to large litters is also to be regarded as an inherent characteristic; consequently, in the selection of a boar, one should be obtained from a large litter.

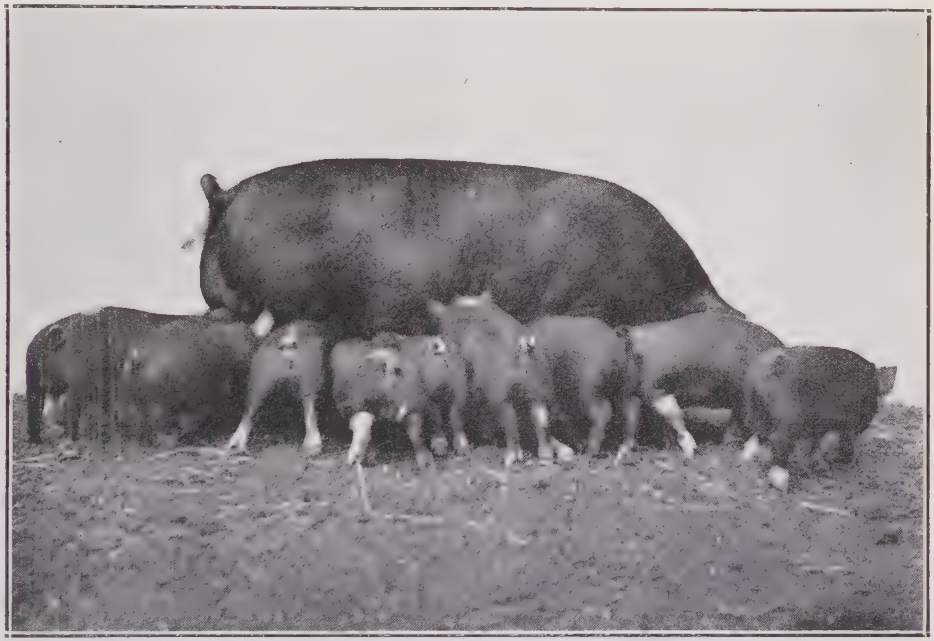

PLATE 115.—BERKSHIRE SOW AND LITTER.

Other indispensable adjuncts which require consideration are—

The parents and herd from which the pig is taken should be healthy; he should be of docile temperament; vigorous, showing evenness in quality, uniformity of conformation, and possessing twelve rudimentary teats; of correct colour and markings, and with decided masculine characteristics, and should be active, strong, and well developed. The age at which a boar may be used will depend to some extent on his development, and at nine months old, if well grown, he may be mated with a limited number of sows, and later on will, if properly cared for, be capable of dealing with from thirty to forty sows in the year.

Good food and water and plenty of exercise are essential to a growing animal, which demands a roomy, well drained and ventilated pen, provided with ample bedding, open to plenty of sunlight, and preferably in a situation affording opportunity to graze. After weaning, his food should consist largely of skim-milk, used in conjunction with pollard and succulent green food like lucerne and peas, with other farm-grown crops such as sliced pumpkins, mangels, sweet potatoes, artichokes, &c., to provide variety and nutriment. Later on, when four or five months old, it is permissible to use crushed and soaked grain of various kinds—barley, maize, wheat, cow peas, &c., with a small quantity, if necessary, of oil cake (previously scalded and allowed to soak for some hours).

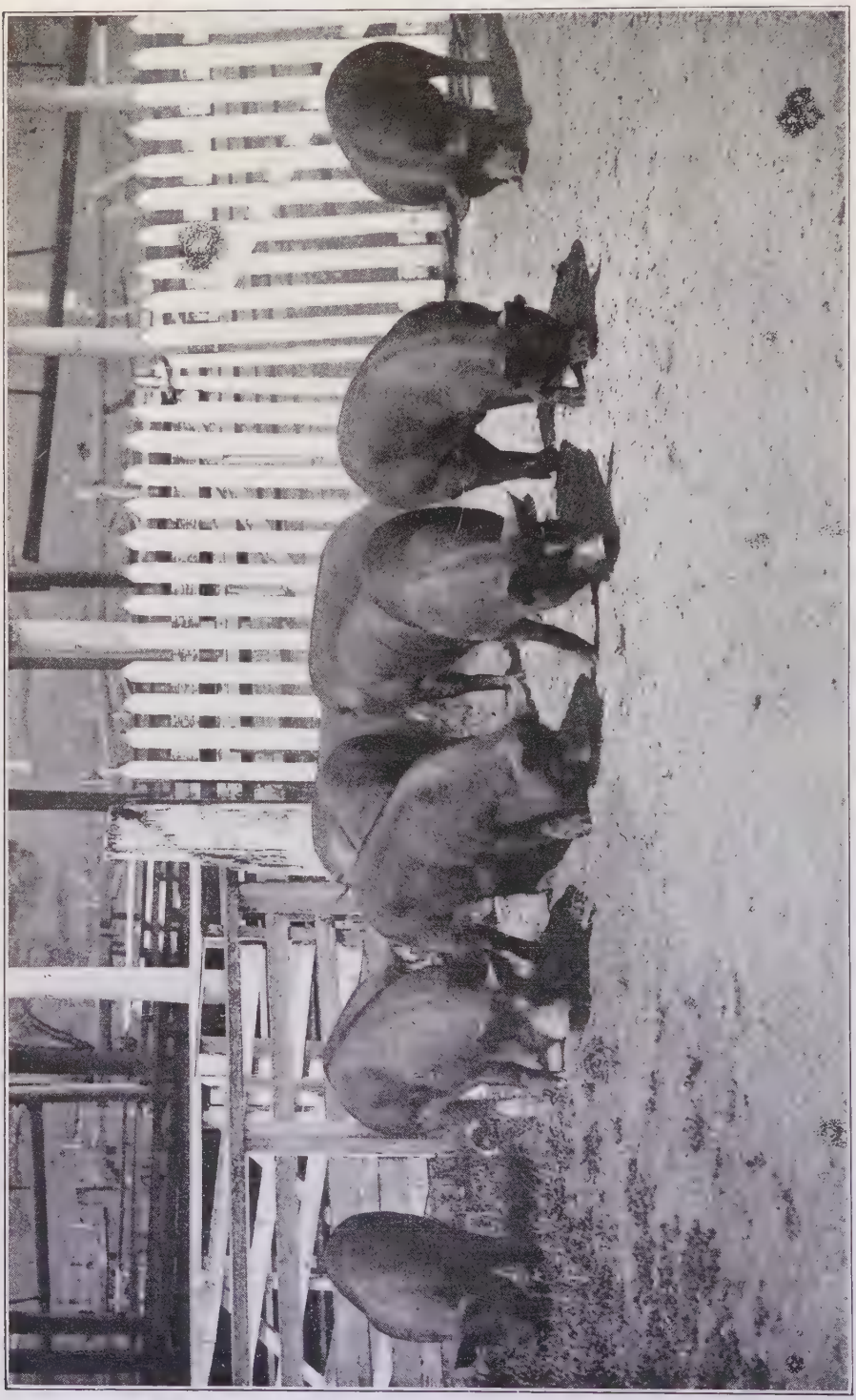

PLATE 116.—LIGHT-WEIGHT BACONERS. (BERKSHIRE GRADES.)

PLATE 117.—BACONERS. (YORKSHIRE GRADES.)

It is advisable to have the boar's pen and run some little distance away from the sows.

Regular feeding three times a day is advisable, but the complement of food given should not be sufficient to fatten the animal.

*The Sow.*—As the primary object of selecting brood sows is for the specific purpose of breeding stud stock, porkers, or baconers, the matter demands a deal of consideration and judgment.

The necessity of using a typical, pure-bred boar has been previously mentioned, and the employment on all occasions of pure-bred male animals cannot be too strongly emphasized. In the case of sows, however, for stud breeding, purity of blood is equally important, and as the raising of porkers and baconers does not demand the use of pedigree sows, but rather of those possessing special qualifications, a description of the type to be utilised is as hereunder:—

The animal must be sound, healthy, and bred from robust, healthy parents. She must possess an inherent maternal instinct, and natural capacity for producing and rearing large litters, in order that a maximum of profit may result. Certain outward and distinctive characteristics are associated with the above essentials, viz.:—The sow selected must be from a large litter, and from family strains known to produce large litters. Her colour, type, and appearance should be in close conformity with the characteristics of the breed she represents.

In temperament, she must be docile and contented, and unselfish when rearing her young.

She requires to be of an active, thrifty disposition, with a capacity to consume and assimilate large quantities of food to benefit the fœtus and progeny rather than herself.

Soundness of constitution and robustness are indispensable, and these features should be associated with fine, rather flat shoulders, good heart room, width of hips, strongly developed spinal column, length and depth of body, and to have from ten to twelve well-placed and prominent teats; her whole appearance giving the impression of a natural roominess and capacity to carry, give birth to, and subsequently to suckle her young.

The antithesis of the true type of brood sow, and that which is to be avoided on all occasions when selecting for breeding purposes, is the short-necked, thick-shouldered, short-bodied, tight-looking, podgy animal of a selfish, lethargic temperament, that lacks the effeminate and true maternal instinct, which in this class is dominated by the inherent tendency to lay on flesh and fat.

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## PROPOSED APPOINTMENT OF A CITRICULTURIST.

Interviewed recently as to the likelihood of a visit to Queensland by Dr. H. J. Webber, Professor of Sub-tropical Horticulture, University of California, the Minister for Agriculture (Hon. W. N. Gillies) stated that when Mr. J. D. Story was recently in America, he (Mr. Gillies), at the request of the Council of Agriculture, communicated with him and requested him to make inquiries as to the possibility of obtaining a citriculturist for Queensland. Mr. Story conferred with the leading Californian authorities on the subject, and ultimately four names were submitted. The salaries required, however, were exceedingly high. Mr. Story advised the Minister that there was a possibility that Dr. Webber, who is regarded as one of the best citrus authorities in America, would be willing to spend a year in Australia if his expenses were defrayed; during that period Professor Webber would be enjoying his leave under the Sabbatical leave arrangements of the University of California. Mr. Story suggested that the question of the appointment of a citriculturist should remain in abeyance, but that Professor Webber should be asked the conditions under which he would be willing to spend, say, six months in Queensland, inquire into the citrus industry generally in this State, and furnish a report thereon; the visit to be arranged under the auspices of the Department of Agriculture, the University, and the Council of Agriculture. Mr. Gillies said that he had approved of these proposals, and that the University Senate and the Council of Agriculture had also concurred regarding the suggested visit of Dr. Webber. Mr. Gillies has written to Professor Webber, and his reply is now awaited.

# THE BANANA BEETLE BORER—V.*

BY JOHN L. FROGGATT, B.Sc., State Entomological Staff.

*Mr. Froggatt is specially investigating the history and habits of the Banana Beetle Borer, and subjoined is his fifth progress report, which has been made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).*

With the advent of a greater realisation of the menace of the Banana Beetle Borer to the banana industry, closer attention is being paid to the individual plantations, with the result that our knowledge of the dispersion of the pest is becoming greatly enlarged. It is still, however, far from being complete, and too strong an emphasis cannot be laid on the fact that the only way in which the problem can be handled successfully is to know the exact limits within which infestation lies. Without this information, no satisfactory control can be exercised over the distribution of banana suckers; this is undoubtedly the greatest means by which the pest is spread from one district to another. It is obviously impossible for one, or even several inspectors to examine the whole of our banana growing areas in anything like a reasonable time, and still more to keep in touch with them continuously. With the active co-operation of the various Fruitgrowers' Associations much valuable information could be obtained, but in only extremely rare instances has this been given. The greater the degree of unity in tackling the pest, the more far-reaching and lasting will be the results obtained.

Once this pest obtains a footing, it is only by constant and continuous vigilance that it can be brought and kept down to a minimum. Control measures cannot be carried out for a little while and then allowed to lapse if lasting benefit is to result. They must be continuous and thorough to be efficient. Although the life of the beetles is a very long one, there is one point in its habits which is of great help in combating it., viz., that it has two distinct periods in the year when it is most actively breeding, from March to May, and from September to November; in the intermediate months but few eggs are laid. This allows a considerable time during which cultural methods of control can be employed with good effect.

During adverse climatic conditions, especially when these are protracted, the effect on the plants, due to grub attack, is greater than in a normal season. This is due to the plant having two adverse factors to contend with—1st, insufficiency of necessary plant food; 2nd, loss of portion of its storage capacity, brought about by the action of the grub in the butt of the plant.

The beetle lays one egg at a time in the bottom of small separate burrows eaten out of the plant, generally about ground level, where they lie just beneath the surface. After several days (6–10 during the active breeding periods) the young grub eats its way out and tunnels into the plant, working gradually into the corm.

It is in this stage that all the harm is done. During part of its life it tunnels through the outer portion of the bulb; while cutting its track, some of the beginnings of the roots are either cut off or damaged; this causes the whole root to die. The effect is twofold. Firstly, the plant loses a certain amount of food through loss of roots and has to use up reserve stores to send out fresh ones. Secondly, when this dying back of the roots is bad, the plants have not enough support in the ground, and fall down. The remainder of the life of the grub is passed in the heart of the bulb, where it destroys a large amount of tissue, thus decreasing the food-storage capacity. Then, also, decay often sets in along these tunnels, still further destroying the bulb. All these factors combine to reduce the vitality of the plant, which has not, in many cases, sufficient strength left to yield a profitable bunch; even if it does not go to such lengths, the number of fruit developed may be considerably decreased and the quality be greatly inferior to what it would have been if the plant had been unaffected by the borer. Where the tunnels are carried into the upper portions of the corm, the central core (*i.e.*, the bunch-stem) may be tapped, resulting in it decaying upwards from the base. In the later stages of the life of the grub it tunnels towards the outer portion of the bulb, coming to rest just underneath the surface, where it lies dormant for two to three days, before turning into the pupa. This is a resting stage, during which the change to the beetle takes place, occupying from five to eight days. When the beetle comes out it is very light coloured and soft; before leaving the corm, it remains in the pupal chamber for about eight days during which time its colour has turned to a dark reddish-brown, or black, and its body has become hard. Mating and egg-laying take place within forty days in the more active periods of the year.

* I., Q.A.J., Sept., 1921, Vol. XVI., pp. 200-208.
II., Q.A.J. May, 1922, Vol. XVII., p. 240.
III., Q.A.J., Oct., 1922, Vol. XVII., p. 279.
IV., Q.A.J., Feb., 1923, Vol. XIX., pp. 68-72.

It is not uncommonly stated that the grubs do not attack living plants and are only found in the old bulbs and corms. This is a complete fallacy, as many growers know to their cost.

It is undoubtedly a fact that this pest is markedly on the increase; more especially is this the case where little or no attention has been paid to carrying out control measures, or else where such have been begun and then neglected. It also cannot be denied that in some localities the beetle has not increased as it might have been expected to do and as it has done in other areas. Careful examination has so far failed to indicate any signs of a parasite, except in the one locality mentioned in the first report published in July, 1921, where the beetle is still prevalent.

The females deposit eggs throughout the greater part of their life, so that the period over which they are capable of continuing and increasing devastation to a plantation is very prolonged.

No variety of banana plant is immune from the attacks of this pest, nor does there seem to be any difference in the relative frequency, or severity, of its depredations in different varieties.

Owing to the whole of the development of the beetle, from egg to adult, being passed inside the plant, leaving no openings on to the surface, all ordinary methods applicable to insect control fail.

So far it has not been possible to carry out tests for plant treatment. All the research work has been devoted to ascertaining the best methods for preventing any increase of the pest in the plantation.

Checking multiplication demands a knowledge of all places where the beetle can breed. It has not been found to develop in anything other than banana plants. In nearly every plantation, one will find numbers of old stems and often corms lying on the ground. These are all ideal places for the pest to breed in, and increase far beyond what would occur if they were rendered unsuitable. They also act as shelter for the beetles. As these have a great value as humus, all growers do not like to burn them, even if wood is available. But if they can be quickly dried, the necessary requirements will be fulfilled. If the corms are split into small pieces, the stems cut up lengthways, and left exposed, the heat of the sun will rapidly remove all moisture and leave them too dry and tough to be any use to the beetles. One objection often raised to this system is that the adult insects will be driven into the standing stools. What if they are? They will then be localised in definite centres, instead of being scattered all over the place, and can be then trapped far more readily, and with a considerable saving of time and labour. Old butts, or decaying stems, left standing in the stools form not only favoured breeding sites, but also constitute further shelter for the beetles, and which they appear to prefer above all else. As old infested butts decay, or are eaten out, the grubs travel into the suckers, or plants, which have grown out from them. These, therefore, should also be removed and destroyed.

It must not be thought that burning these plant-portions is deprecated, for this is by no means the case. It is fully recognised and advocated as the most complete method of destruction possible.

Experiments have been begun to ascertain whether it is possible to drive the beetles in the soil away from the stools, the tendency being for them to move towards the surface. If any such successful means can be elaborated, trapping would be made much more effective, as well as setting a protective barrier around the stool.

*Trapping.*—This consists of placing split pieces of banana corm, or stem, flat on the bare ground, in or just outside infested stools or wherever cut stems or corms are found showing signs of infestation. The beetles come to feed on these baits and congregate either on the underside of them or just underneath the surface of the soil. The baits should be examined as often as possible, up to once a day, in the morning for preference, as the maximum number of beetles will then be obtained.

A considerable amount of work has been done in testing the effects of various poisons, when applied to corm baits, on the beetles. The main points that have to be considered are—

(1) That the poison must be a cheap one, and readily obtainable.

(2) That it must kill the beetles after feeding for only a short time on the treated material. Some of the poisons have been used in solution, others as dry powders. Amongst the latter were several that are practically insoluble; others were used as a check against the same chemicals in solution.

Those used in solution have proved very unsatisfactory. Some of the dry powder poisons, on the other hand, have given results, under laboratory conditions, that are most promising. A considerable amount of work remains to be done along

PLATE 118.—EGGS OF BANANA BEETLE BORER EXPOSED FOR EXAMINATION.

these lines, however, before definite conclusions can be drawn. Field tests will then be carried out and recommendations, if any, made in due course.

In the laboratory experiments a definite number of beetles were exposed to the poisoned corm for certain periods of time, at the expiration of which they were transferred on to fresh food and examined from day to day to ascertain results.

The most satisfactory poison tested to date has been Paris green, killing 97.5 per cent. in an exposure to the treated corm of 3 to 7½ hours. After feeding on the poisoned material for 18 to 48 hours the pure powder killed 99.4 per cent.

Arsenite of soda in solution of a 2 per cent. strength (1 lb. to 5 gallons water) only accounted for 10.5 per cent. of the beetles in 18 to 48 hours exposure. When used as a finely ground powder, it destroyed 92.5 per cent. of the beetles with an 18 to 54 hours period.

Borax proved to be a slow-acting poison. Used dry, and finely ground, it killed 94.4 per cent. of the beetles in 18 to 66 hours, but only 48.75 per cent. over a 3 to 24 hours period. It would thus seem that the beetles have to consume a considerable amount of the poison before death ensues.

Calcium arsenate used pure destroyed 68.75 per cent. over a period of 18 to 48 hours.

Time of year exercises a great influence on the destructive effect of poison—due probably to the more quiescent habits of the beetles in the cooler weather.

For example, pure dry borax killed 85 per cent. of the beetles in July and 94.4 per cent. in November over similar periods of exposure to the poisoned corm. It is thus evident that the greatest attention should be paid to the poisoning during portions of the year when the beetles show their greatest activity.

The simplest way to detect the presence of beetle borer, at any stage beyond that of the egg, is to cut open stems, or old corms, on the ground, or butts in the stools. If the pest is present, the tunnels made by the grubs will be found and probably also the grubs and beetles. The tunnels for the most part are tightly packed with the chewed-up plant material which the grub has passed through its body; when dry it is like sawdust. The tunnels may be cut straight across, when they appear as circular holes, or cut at an angle, appearing more elongated. If there is any doubt, specimens sent to the Entomologist-in-Charge will be examined, and full information sent in reply.

Before laying out a plantation, two very necessary precautions to be observed are—

(1) That the site selected is not close to, or adjoining, an infested banana area. Where this has been inadvertently done, precautions must be taken to prevent the pest spreading into the new portion.

(2) That the plantation from which the suckers for planting are to be obtained is free from the beetle borer. Whenever possible take the further precaution of never permitting the suckers after removal from the stool to remain on the ground overnight. If infestation is slight, it can quite easily be overlooked unless the examination for it has been very thorough. Should this oversight have occurred, these suckers will act as baits, and beetles attracted to them may deposit eggs. Though perfectly free from the pest when dug, they may be, in whole or in part, infested when carted away.

Many instances have been noticed where plantations have been started alongside of older infested ones. Sooner or later, as the supply of plant material diminishes, the beetles will begin to migrate into the new area where there is abundance of the food, and breeding grounds which they require. Wherever this condition of affairs is found to exist, lines of corm baits should be laid between the old and new areas. They must be carefully and systematically examined, so that they may form an effective means of preventing the ingress of the pest. Whenever possible steps should be taken to get the old area cleaned up. An examination of the suckers for beetle borer infestation, unless fairly well developed grubs are present, is an impossible task, because the egg and very tiny grubs are so difficult to detect. In order to examine them thoroughly, the suckers would have to be cut about to such an extent as to render them useless for planting. Even if it were feasible on the above conditions, the time that would need to be taken to examine them thoroughly would be so great as to render the task an impossible one.

Butts, which are often used for planting, offer better facilities for examination, because, when present, the grubs, or their tunnels, will readily be seen when the corm is cut open.

A brief description of the different stages in the life history of the beetle, although it has been given before, should be of interest, for we are constantly being asked what the grub and beetle are like.

*Photo: Dept. of Agriculture and Stock.*]

PLATE 119.—BUTT OF BANANA PLANT.

Showing effect of infestation by *C. sordidus*. Scale, 2 centimetres (2 cent. = 1 inch).

Note—(1) tunnelling in outer part of corm; (2) plant decay spreading from grub tunnels in centre of corm; (3) destruction of central core of plant by grubs.

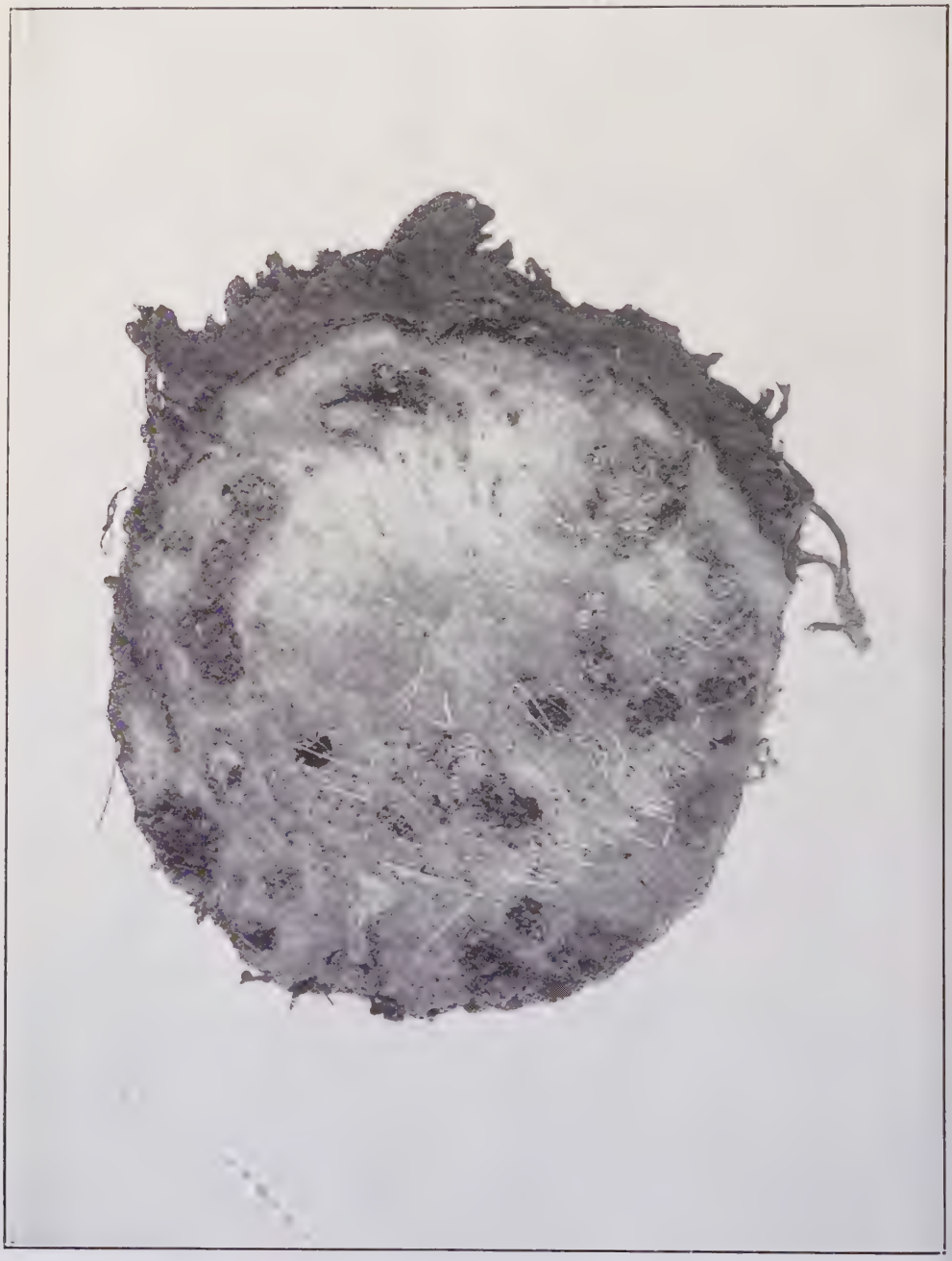

PLATE 120.—INFESTED BANANA CORM, SHOWING GRUB TUNNELS.

*The Egg* is white and about one-twelfth of an inch long, being elongate with rounded ends.

*The Grub,* when full grown, is slightly more than half an inch long; it is a thick, legless, white grub with a reddish-brown head.

*The Pupa* (or chrysalis) is white and about half an inch long; the outlines of the beetle are plainly shown in this stage.

*The Beetle,* when mature, is black in colour, somewhat less than half an inch in length, with a slightly curved trunk projecting in front, and is extremely hard. When disturbed, it lies as if dead, with the legs drawn up against the body, for a considerable time. It has often been stated that the beetles fly. Laboratory and field tests have, so far, given negative results, but any information of observations made by growers on this matter will be welcomed. It is possible that it may fly at certain times of the year, but this is still only supposition. It is not attracted to light.

The main points to remember in fighting this pest are—

(1) The beetles have a long life and the females deposit eggs during the greater part of it. Therefore, catch and kill them as soon after they leave the plant as possible, thus reducing the number of eggs that may be laid.

PLATE 121.—GRUB PUPA, AND ADULT OF BEETLE BORER.
(Natural s.ze.)

(2) During the heat of summer, and cold of winter, breeding is much less than in the spring and autumn. There are thus two periods of the year when a great deal can be done to check the depredations of the beetle, while it is more or less inactive.

(3) Keep a close watch for signs of infestation in the stools, and wherever found, remove the portions attacked, and destroy them. Lay corm baits on these spots, and keep at it until no beetles are trapped for several days in succession. When infested stems or corms are found on the ground, they too must be destroyed and baits left in their place.

PLATE 122.—EGGS OF *C. sordidus* TRANSFERRED FOR OBSERVATION.

PLATES.

118. Egg.
119. Plate 54, October, 1922. (Butt of Banana Plant, showing effects of infestation. Scale: 2 centimetres (2.5 centimetres to 1 inch). Note: (1) Tunnelling in outer and inner parts of corm; (2) Plant decay spreading from grub tunnels in centre of corm; (3) Destruction of central core (bunch-stem) by grubs.
120. Plate 22, February, 1923. (Infested Banana Corm, showing grub tunnels).
121. Plate 24, February, 1923. (Grub Pupa and Adult of Beetle Borer; natural size).

JOHN L. FROGGATT, B.Sc., Entomologist.

## THE FRUIT INDUSTRY EDUCATIONAL WORK.

Recently the Chief Instructor in Fruit Culture (Mr. J. M. Ward) and the Packing Instructor (Mr. W. Rowlands) visited the Cleveland and Redland Bay fruit districts for the purpose of giving practical instruction to growers on matters pertaining to the fruit industry generally. Mr. Ward also lectured in the local schoolroom on subjects of vital importance to growers in these districts. Many individual orchards were visited where, in some instances, a number of custard-apple trees were found to be suffering from one of the root-rot fungoids. Growers were shown how to combat this disease in a practical manner. As this trouble is prevalent to some extent in the Cleveland district, arrangements were made for Mr. R. W. Peters (Assistant Instructor in Fruit Culture) to spend at least a week or two in the locality for the purpose of giving individual instruction in this and other subjects in connection with fruit trees. Fruitgrowers expressed their appreciation for this arrangement. Demonstrations were given by Mr. Rowlands in the packing of pineapples, custard apples, oranges, mandarins, lemons, and tomatoes. At these demonstrations the question of improving the packing of pineapples was gone into in detail. Many valuable suggestions were offered by several growers who have given this subject considerable attention.

At Redland Bay a large number of growers assembled at the packing shed of Mr. Jas. Collins for the purpose of witnessing Mr. Rowlands pack and grade oranges in the new citrus case. The meeting was at first anything but favourable towards the

new citrus case, but after witnessing the method of packing, as demonstrated by Mr. Rowlands, one and all were more than favourably impressed with the case and pack. Growers generally were very appreciative of the work of the visitors, who were asked to again visit the district for the purpose of delivering lantern slide lectures and holding fruit-packing classes, and an arrangement was made for Mr. Ward to lecture on 31st July, as this was the earliest date available. Mr. Peters was also in the Redland Bay district recently, and did good work in a number of local orchards.

## HISTORIC BANANAS.

The two bunches of bananas which were produced at the recent meeting of the Chambers of Commerce just at the psychological moment assisted materially to sway the opinions of the delegates in Queensland's favour. They may be regarded as appropriate reminders of the fight for maintenance of adequate tariff protection. These bananas were from the Blackall Range, and contained 39 dozen. They were hurriedly selected by the markets officer of the Council of Agriculture, in conjunction with a representative of the S.Q.F.S., Limited, from supplies sent to Brisbane markets for sale that day.

Fine as these specimen bunches were, there were even better bunches on the market from the Brookfield district, but these were unprocurable.

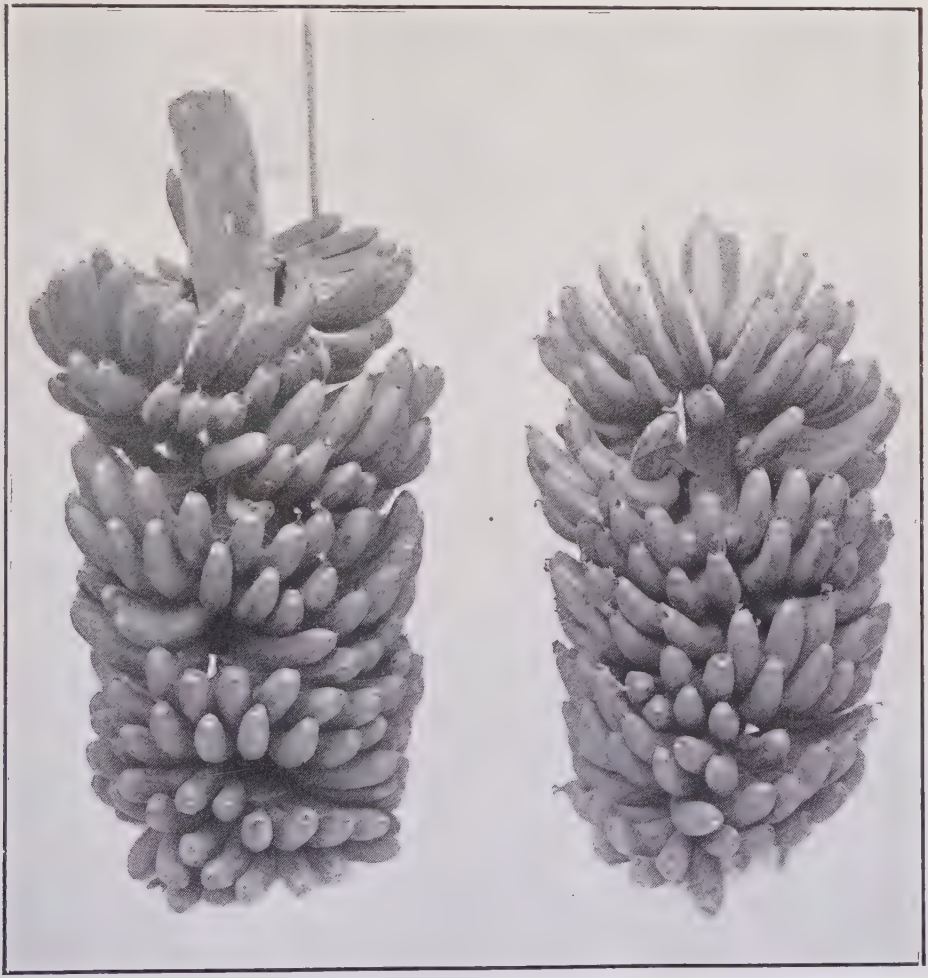

PLATE 123.—A FRUITFUL ARGUMENT IN FAVOUR OF TARIFF PROTECTION FOR QUEENSLAND BANANAS.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY 1923.

The weather conditions during the month have not been satisfactory for egg production. The sudden and varied changes in weather have, to some extent, upset the competition birds, but it is pleasing to note how some of the hardier keep to their work and have put up some good scores. Where the scores are small, this is due in some cases to the birds going into moult, also to the fact that many were on the young side when sent, and these are just commencing to lay. The appetite of the competitors is much better than it was, and nearly all the pens have settled down to business, and should do well. The following are the individual records:—

| Competitors. | Breed. | May. | Total. |
|---|---|---|---|
| **LIGHT BREEDS.** | | | |
| *C. H. Singer | White Leghorns | 123 | 209 |
| *S. L. Grenier | Do. | 106 | 200 |
| *W. and G. W. Hindes | Do. | 122 | 197 |
| *N. A. Singer | Do. | 118 | 195 |
| Jas. Hutton | Do. | 90 | 190 |
| *J. W. Newton | Do. | 106 | 186 |
| *Rock View Poultry Farm | Do. | 102 | 182 |
| *Oakleigh Poultry Farm | Do. | 101 | 181 |
| *Ancona Poultry Club | Anconas | 111 | 179 |
| *O Goos | White Leghorns | 101 | 178 |
| Beckley Poultry Farm | Do. | 94 | 174 |
| *J. W. Short | Do. | 86 | 164 |
| F. Sparsholt | Do. | 108 | 161 |
| *R. C. J. Turner | Do. | 83 | 157 |
| Jas. Harrington | Do. | 80 | 157 |
| *J. M. Manson | Do. | 100 | 150 |
| G. Marks | Do. | 95 | 149 |
| W. A. and J. Pitkeathly | Do. | 61 | 148 |
| G. E. Rogers | Do. | 83 | 146 |
| *Mrs. L. Andersen | Do. | 92 | 145 |
| *Bathurst Poultry Farm | Do. | 101 | 145 |
| *G. Williams | Do. | 84 | 138 |
| *Arch. Neil | Do. | 82 | 137 |
| *H. P. Clarke | Do. | 100 | 130 |
| *H. Fraser | Do. | 79 | 130 |
| Jas. Earl | Do. | 80 | 126 |
| *A. C. G. Wenck | Do. | 88 | 125 |
| *Mrs. R. E. Hodge | Do. | 66 | 125 |
| W. Becker | Do. | 90 | 120 |
| C. Quesnell | Do. | 61 | 117 |
| Chapman and Hill | Do. | 63 | 116 |
| W. and G. W. Hindes | Brown Leghorns | 62 | 114 |
| *C. A. Goos | White Leghorns | 77 | 102 |
| *Mrs. E. White | Do. | 69 | 100 |
| E. Ainscough | Do. | 50 | 94 |
| Parisian Poultry Farm | Do. | 50 | 72 |
| J. Purnell | Do. | 48 | 63 |
| N. J. Nairn | Do. | 40 | 56 |
| **HEAVY BREEDS.** | | | |
| *W. Becker | Chinese Langshans | 107 | 209 |
| *Jas. Hutton | Black Orpingtons | 108 | 181 |
| *R. Burns | Do. | 109 | 180 |
| *Mrs. A. E. Gallagher | Do. | 98 | 171 |
| *Jas. Ferguson | Chinese Langshans | 110 | 170 |

* Indicates that the pen is being single tested.

## EGG-LAYING COMPETITION—*continued.*

| Competitors. | Breed. | May. | Total. |
|---|---|---|---|
| **HEAVY BREEDS—*continued.*** | | | |
| R. Conochie ... ... ... ... | Black Orpingtons ... | 86 | 170 |
| J. R. Douglas ... ... ... ... | Do. ... ... | 87 | 168 |
| *E. Walters ... ... ... ... | Do. ... ... | 103 | 161 |
| Beckley Poultry Farm ... ... ... | Do. ... ... | 82 | 159 |
| *Jas. Potter .. ... ... ... | Do. ... ... | 106 | 157 |
| Mrs. A. Kent ... ... ... ... | Do. ... ... | 93 | 144 |
| *H. M. Chaille ... ... ... ... | Do. ... ... | 72 | 139 |
| W. T. Solman ... ... ... ... | Do. ... ... | 95 | 137 |
| *Parisian Poultry Farm ... ... ... | Do. ... ... | 101 | 136 |
| *J. H. Jones ... ... ... ... | Do. ... ... | 84 | 134 |
| *E. F. Dennis ... ... ... ... | Do. ... ... | 70 | 133 |
| *R. Holmes ... ... ... ... | Do. ... ... | 68 | 127 |
| *T. Hindley ... ... ... ... | Do. ... ... | 87 | 122 |
| *Rev. A. McAllister ... ... ... | Do. ... ... | 80 | 112 |
| H. B. Stephens ... ... ... ... | Do. ... ... | 60 | 101 |
| W. G. Badcock ... ... ... | Ch. Langshans ... ... | 70 | 96 |
| Jas. Ferguson ... ... ... ... | Plymouth Rocks ... | 95 | 95 |
| G. E. Rogers ... ... ... ... | Black Orpingtons ... | 62 | 87 |
| W. F. Ruhl ... ... ... ... | Do. ... ... | 50 | 84 |
| V. J. Rye ... ... ... ... .. | Do. ... ... | 40 | 73 |
| *C. C. Dennis ... ... ... ... | Do. ... ... | 43 | 58 |
| F. J. Murphy ... ... ... ... | Do. ... ... | 16 | 26 |
| Jas. Ferguson ... ... ... ... | Rhode Island Reds ... | 24 | 24 |
| Mos. Stephens ... ... ... ... | Black Orpingtons ... | 20 | 20 |
| Total ... ... ... ... | ... | 5,478 | 9,032 |

## DETAILS OF SINGLE HEN PENS.

| Competition. | A. | B. | C. | D. | E. | F. | Total. |
|---|---|---|---|---|---|---|---|
| **LIGHT BREEDS.** | | | | | | | |
| C. H. Singer .. .. .. .. | 34 | 49 | 32 | 23 | 30 | 41 | 209 |
| S. L. Grenier .. .. .. | 32 | 31 | 36 | 34 | 35 | 32 | 200 |
| W. and G. W. Hindes .. .. | 27 | 41 | 23 | 23 | 40 | 43 | 197 |
| N. A. Singer .. .. .. | 30 | 39 | 38 | 36 | 25 | 27 | 195 |
| J. W. Newton .. . | 34 | 35 | 32 | 17 | 31 | 37 | 186 |
| Rockview Poultry Farm .. . | 32 | 40 | 34 | 34 | 24 | 18 | 182 |
| Oakleigh Poultry Farm .. .. | 36 | 33 | 28 | 28 | 32 | 24 | 181 |
| Ancona Club .. .. . | 30 | 28 | 35 | 23 | 26 | 37 | 179 |
| O. Goos .. .. .. .. | 28 | 36 | 36 | 22 | 26 | 30 | 178 |
| Beckley Poultry Farm .. | 35 | 24 | 15 | 33 | 31 | 36 | 174 |
| J. W. Short .. .. .. .. | 24 | 26 | 31 | 34 | 33 | 16 | 164 |
| R. C. J. Turner .. .. .. | 13 | 30 | 32 | 31 | 15 | 36 | 157 |
| J. M. Manson .. .. .. | 19 | 18 | 32 | 32 | 23 | 26 | 150 |
| Mrs. L. Andersen .. .. .. | 11 | 32 | 31 | 35 | 17 | 19 | 145 |
| Bathurst Poultry Farm .. .. | 22 | 29 | 23 | 30 | 20 | 21 | 145 |
| Geo. Williams .. .. .. | 32 | 34 | 12 | 27 | 17 | 16 | 138 |
| Arch Neil .. .. .. .. | 23 | 16 | 11 | 28 | 35 | 24 | 137 |
| H. P. Clarke .. .. .. | 32 | 10 | 28 | 15 | 22 | 23 | 130 |
| H. Fraser .. .. .. .. | 30 | 15 | 17 | 15 | 25 | 28 | 130 |
| A. C. G. Wenck .. .. .. | 20 | 12 | 22 | 26 | 18 | 27 | 125 |
| Mrs. R. E. Hodge .. .. .. | 11 | 21 | 11 | 28 | 30 | 24 | 125 |
| C. A. Goos .. .. .. .. | 20 | 35 | 23 | 14 | 5 | 5 | 102 |
| Mrs. E. White .. .. .. | 16 | 11 | 30 | 20 | 11 | 12 | 100 |
| J. Purnell .. .. .. .. | 10 | 0 | 20 | 3 | 21 | 9 | 63 |
| N. J. Nairn .. .. .. .. | 23 | 1 | 19 | 10 | 2 | 1 | 56 |

## EGG-LAYING COMPETITION—*continued.*

### DETAILS OF SINGLE HEN PENS—*continued.*

| Competitors. | A. | B. | C. | D. | E. | F. | Total. |
|---|---|---|---|---|---|---|---|
| **HEAVY BREEDS.** | | | | | | | |
| W. Becker | 40 | 43 | 39 | 33 | 24 | 30 | 209 |
| Jas. Hutton | 35 | 32 | 40 | 28 | 18 | 28 | 181 |
| R. Burns | 39 | 22 | 26 | 14 | 49 | 30 | 180 |
| Mrs. A. E. Gallagher | 30 | 36 | 27 | 29 | 27 | 22 | 171 |
| Jas. Ferguson | 34 | 31 | 29 | 24 | 30 | 22 | 170 |
| E. Walters | 39 | 38 | 17 | 17 | 21 | 29 | 161 |
| Jas. Potter | 14 | 36 | 26 | 23 | 23 | 35 | 157 |
| Mrs. A. Kent | 17 | 43 | 26 | 38 | 16 | 4 | 144 |
| H. M Chaille | 18 | 33 | 34 | 32 | 6 | 16 | 139 |
| Parisian Poultry Farm | 7 | 14 | 26 | 27 | 27 | 35 | 136 |
| J. H. Jones | 22 | 26 | 26 | 21 | 7 | 32 | 134 |
| E. F. Dennis | 36 | 22 | 16 | 18 | 27 | 14 | 133 |
| R. Holmes | 23 | 12 | 27 | 11 | 23 | 31 | 127 |
| T. Hindley | 18 | 29 | 30 | 33 | 8 | 4 | 122 |
| C. C. Dennis | 12 | 17 | 2 | 10 | 8 | 9 | 58 |

CUTHBERT POTTS, Principal.

## ZILLMERE COMPETITION REPORT FOR APRIL.

The Sixth Single Test Laying Competition organised by the Queensland Branch of the N.U.P.B.A. was commenced at Zillmere on 1st April. There are 86 White Leghorns, 34 Black Orpingtons, and 12 other varieties under test, comprising two each Barred Rocks, Langshans, Minorcas, Anconas, Brown Leghorns, and Silver Wyandottes. Additional interest attaches to this competition on account of the fact that two birds are from Tasmania and eight from New South Wales. Some birds have not yet settled down to their new quarters and others are starting to moult, while No. 115 is broody. The total number of eggs for the month was 1,362, an average of 10.32 per bird.

WHITE LEGHORNS.

| Pen No. | Owner. | | Pen No. | Owner. | |
|---|---|---|---|---|---|
| 62 | Miss L. M. Dingle | 26 | 76 | W. Shaffrey | 17 |
| 8 | Oakleigh P.F. | 23 | 18 | A. W. Ward | 16 |
| 42 | W. Wakefield | 23 | 32 | H. Needs | 16 |
| 14 | Enroh Pens | 22 | 50 | J. Harrington | 16 |
| 33 | A. S. Walters | 22 | 10 | R. C. J. Turner | 15 |
| 40 | J. Earl | 22 | 48 | R. D. Chapman | 15 |
| 75 | W. Shaffrey | 22 | 65 | R. Duff | 15 |
| 66 | R. Duff | 21 | 55 | G. Baxter | 14 |
| 15 | W. J. Berry | 20 | 57 | H. Fraser | 14 |
| 22 | M. F. Newberry | 20 | 74 | A. Hodge | 14 |
| 41 | W. Wakefield | 20 | 7 | Oakleigh P.F. | 13 |
| 13 | Enroh Pens | 19 | 35 | J. T. Webster | 13 |
| 27 | H. T. Britten | 19 | 28 | H. T. Britten | 12 |
| 45 | F. R. Koch | 19 | 26 | E. Stephenson | 12 |
| 61 | L. M. Dingle | 19 | 59 | G. Scaletti | 12 |
| 64 | S. Lloyd | 19 | 3 | T. H. Craig | 11 |
| 81 | J. E. G. Purnell | 19 | 58 | H. Fraser | 11 |
| 30 | W. and G. W. Hindes | 18 | 24 | Parisian P.Y. | 10 |
| 36 | J. T. Webster | 18 | 38 | G. Williams | 10 |
| 49 | J. Harrington | 18 | 39 | J. Earl | 10 |
| 16 | W. J. Berry | 17 | 19 | W. Witt | 9 |
| 31 | H. Needs | 17 | 20 | W. Witt | 9 |
| 43 | Kelvin P.Y. | 17 | 11 | A. Neil | 9 |
| 72 | W. H. Forsayth | 17 | 46 | F. R. Koch | 9 |

## ZILLMERE COMPETITION REPORT FOR APRIL—*continued.*

WHITE LEGHORNS—*continued.*

| Pen No. | Owner. | | Pen No. | Owner. | |
|---|---|---|---|---|---|
| 51 | Kidd Bros. | 9 | 1 | Carinya P.F. | 3 |
| 69 | R. Shaw | 9 | 2 | Carinya P.F. | 3 |
| 54 | H. Holmes | 8 | 4 | T. H. Craig | 3 |
| 70 | R. Shaw | 8 | 44 | Kelvin P.Y. | 3 |
| 17 | A. W. Ward | 7 | 71 | W. H. Forsyth | 3 |
| 25 | E. Stephenson | 7 | 73 | A. Hodge | 3 |
| 37 | G. Williams | 7 | 77 | W. Smith | 3 |
| 84 | L. Andersen | 7 | 47 | R. D. Chapman | 2 |
| 86 | A. Cowley | 6 | 83 | L. Andersen | 2 |
| 6 | P. J. Fallon | 5 | 68 | J. and G. Green | 1 |
| 21 | M. F. Newberry | 5 | 82 | J. E. G. Purnell | 1 |
| 29 | W. and G. W. Hindes | 5 | 9 | R. C. J. Turner | 0 |
| 56 | G. Baxter | 5 | 12 | A. Neil | 0 |
| 34 | A. S. Walters | 5 | 23 | Parisian P.Y. | 0 |
| 67 | J. and G. Green | 5 | 52 | Kidd Bros. | 0 |
| 78 | W. Smith | 5 | 53 | H. Holmes | 0 |
| 85 | A. Cowley | 5 | 60 | G. Scaletti | 0 |
| 5 | P. J. Fallon | 4 | 79 | Wm. Bliss | 0 |
| 63 | S. Lloyd | 4 | 80 | Wm. Bliss | 0 |

BLACK ORPINGTONS.

| Pen No. | Owner. | | Pen No. | Owner. | |
|---|---|---|---|---|---|
| 95 | J. Potter | 27 | 106 | W. Smith | 7 |
| 96 | J. Potter | 25 | 88 | Parisian P.Y. | 6 |
| 112 | H. M. Chaille | 25 | 91 | J. Pryde | 5 |
| 92 | J. Pryde | 24 | 105 | W. Smith | 4 |
| 119 | J. Harrington | 24 | 107 | E. F. Dennis | 4 |
| 111 | H. M. Chaille | 23 | 117 | E. C. Raymond | 4 |
| 102 | Enroh Pens | 22 | 97 | W. Shaffrey | 3 |
| 120 | J. Harrington | 21 | 108 | E. F. Dennis | 3 |
| 110 | T. H. Brotherton | 20 | 109 | T. H. Brotherton | 3 |
| 113 | E. Walters | 19 | 118 | E. C. Raymond | 2 |
| 89 | K. Macfarlane | 17 | 94 | H. B. Stephens | 1 |
| 87 | Parisian P.Y. | 16 | 90 | K. Macfarlane | 0 |
| 99 | S. Donovan | 15 | 98 | W. Shaffrey | 0 |
| 115 | C. C. Dennis | 15 | 101 | Enroh Pens | 0 |
| 104 | L. Pritchard | 12 | 103 | L. Pritchard | 0 |
| 93 | H. B. Stephens | 11 | 114 | E. Walters | 0 |
| 100 | S. Donovan | 9 | 116 | C. C. Dennis | 0 |

OTHER VARIETIES.

| Pen No. | Owner. | | Pen No. | Owner. | |
|---|---|---|---|---|---|
| 128 | A. S. Walters (B.R.) | 24 | 124 | J. Ferguson (Anc.) | 1 |
| 126 | J. Ferguson (Lang.) | 16 | 125 | J. Ferguson (Lang.) | 1 |
| 131 | W. H. Forsyth (S.W.) | 16 | 121 | Parisian P.Y. (B.L.) | 0 |
| 127 | A. S. Walters (B.R.) | 6 | 122 | Parisian P.Y. (B.L.) | 0 |
| 130 | R. A. Girling (Min.) | 6 | 123 | J. Ferguson (Anc.) | 0 |
| 129 | R. A. Girling (Min.) | 4 | 132 | W. H. Forsyth (S.W.) | 0 |

## REMOVAL OF BANANA PLANTS PROHIBITED.

An order has been issued under the Diseases in Plants Act prohibiting the removal of any banana plants (except the fruit thereof) from what is known as the North Coast Fruit District. This notice has been issued to prevent the spread of the banana beetle borer. The county of Lennox and that part of the county of Canning embraced in Bribie Island and the parish of Wararba are exempted from the prohibition, as the latter described area is still free from the borer.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL 1923 AND 1922 FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | April. | No. of Years' Records. | April, 1923. | April, 1922. | | April, | No. of Years' Records. | April, 1923 | April, 1922 |
| *North Coast.* | In. | | In. | In | *South Coast*— continued: | In. | | In. | In. |
| Atherton ... ... | 4·56 | 22 | 2·98 | 2 14 | Nambour ... ... | 4·94 | 27 | 19 06 | 1·36 |
| Cairns ... ... | 12·19 | 41 | 5·01 | 11·85 | Nanango ... ... | 1·83 | 41 | 1·71 | 0·07 |
| Cardwell ... ... | 9·74 | 51 | 5·69 | 3·92 | Rockhampton ... | 2·23 | 52 | 2·82 | 0·78 |
| Cooktown ... ... | 9·21 | 47 | 4·59 | 7·68 | Woodford ... ... | 4·15 | 36 | 7·14 | 0·88 |
| Herberton ... ... | 4·36 | 36 | 1·95 | 1·89 | | | | | |
| Ingham ... ... | 8·86 | 31 | 6·75 | 4·58 | | | | | |
| Innisfail ... ... | 21·62 | 42 | 15·37 | 10·27 | *Darling Downs.* | | | | |
| Mossman ... ... | 12·00 | 15 | 5·64 | 6·13 | | | | | |
| Townsville ... ... | 3·83 | 32 | 0·83 | 0·27 | Dalby ... ... | 1·24 | 53 | 0·45 | ... |
| | | | | | Emu Vale ... ... | 1·16 | 27 | 0·61 | 0·05 |
| *Central Coast.* | | | | | Jimbour ... ... | 1·26 | 35 | 0·30 | ... |
| | | | | | Miles ... ... | 1·38 | 38 | 0·39 | ... |
| Ayr ... ... ... | 2·86 | 36 | 0·55 | 0·02 | Stanthorpe ... | 1·69 | 50 | 0·78 | 0·49 |
| Bowen ... ... | 2 90 | 52 | 0·85 | 0·13 | Toowoomba ... | 2·46 | 51 | 0·74 | 0·24 |
| Charters Towers ... | 1·76 | 41 | 0·84 | 0·05 | Warwick ... ... | 1 64 | 58 | 0·36 | 0 05 |
| Mackay ... ... | 6·78 | 52 | 4·66 | 2·54 | | | | | |
| Proserpine ... ... | 6·70 | 20 | 2·36 | 2·51 | | | | | |
| St. Lawrence ... | 2 80 | 52 | 3·21 | 0 61 | *Maranoa.* | | | | |
| | | | | | | | | | |
| *South Coast.* | | | | | Roma ... ... | 1·26 | 49 | 0·86 | ... |
| | | | | | | | | | |
| Biggenden ... ... | 1·71 | 24 | 5·74 | 0·09 | | | | | |
| Bundaberg ... ... | 2·88 | 40 | 6·60 | 0·50 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 3·63 | 72 | 5·83 | 0·27 | | | | | |
| Childers ... ... | 2·46 | 28 | 6·91 | 0·57 | Bungeworgorai ... | 0·77 | 9 | 0·91 | ... |
| Crohamhurst ... | 5·70 | 30 | 14·39 | 1·72 | Gatton College ... | 1·62 | 24 | 0·75 | 0 02 |
| Esk ... ... ... | 2·62 | 36 | 2·43 | 0 07 | Gindie .. ... | 1·19 | 24 | 1·21 | ... |
| Gayndah ... ... | 1·30 | 52 | 3·35 | ... | Hermitage ... | 1·25 | 17 | 0·36 | 0·03 |
| Gympie ... ... | 3·09 | 53 | 7·23 | 0·30 | Kairi ... ... | 5·27 | 9 | 3·86 | 3·01 |
| Glasshouse Mts. ... | 4·88 | 15 | 11·05 | 0·76 | Sugar Experiment Station, Mackay | 5·30 | 26 | 3·66 | 2·15 |
| Kilkivan ... ... | 2·06 | 44 | 2·37 | ... | Warren ... ... | 1·19 | 9 | ... | ... |
| Maryborough ... | 3·31 | 52 | 9·19 | 0·12 | | | | | |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

## WHEN TO INOCULATE.

The spring or autumn is the best time to inoculate for tick fever, providing the animals have access to green feed and fresh water, and suitable shade trees.

Stud animals can be done at any time of the year, providing they are stalled, and not exposed to extremes of temperature, and not unduly excited during the inoculation fever period, which usually ranges from the eighth to the twentieth day.

If the animal responds to the injection of recovered blood, it is not necessary to reinoculate, as the animal will not react again.

Many years of close observation have definitely demonstrated that there is no such thing as strong and mild blood. The apparent difference is due to variation in the susceptibility of the animal inoculated. Some animals are so resistant at the time of inoculation that they fail to react, and show no sign of illness, while others injected with the same blood readily react, in fact, certain individuals are so susceptible that the inoculation fever may be so severe as to end fatally.

If ticks are always present on the farm, it is not necessary to inoculate every year.—C. J. POUND, Government Bacteriologist.

# General Notes.

### Open Season for Opossums.

An Order in Council has been issued under "*The Animals and Birds Act of* 1921," the effect of which is to provide for an open season for opossums for two months from the 1st June, 1923, to the 31st July, 1923. The season for native bears remains closed.

### Northern Pig Pool.

A notification has been issued under the Primary Products Pools Act, stating that it is the intention to create a pool for pigs raised in the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, for two years from the 1st July, 1923. A notice has also been issued calling for nominations for the membership of the proposed board.

### Departmental Appointments.

Mr. A. E. Mitchell, of Norman avenue, Norman Park, has been appointed an Inspector under "*The Slaughtering Act of* 1898," at the Department of Agriculture and Stock as from the 18th May, 1923.

Messrs. A. Nagle and A. Hamilton, of Capella, and Manly, N.S.W., respectively, have been appointed Agricultural Field Assistants as from the 19th May.

Mr. H. N. Gannon, of Woodbury, Central Queensland, has been appointed an Honorary Inspector under "*The Diseases in Plants Act of* 1916."

### Checking Prickly-Pear—An Experiment Endangered.

It is expected that within twelve months it will be possible to commence on a big scale the distribution of cochineal insects for the destruction of prickly-pear. Some six varieties of wild cochineal insect have been under observation in the experimental laboratory at Sherwood, where large quantities are being carefully bred in sealed cages. Unfortunately, this entire scheme of the Commonwealth Prickly-pear Board is in danger of being upset by the action of individuals in using a Chico cochineal in pear country. This cochineal, said the Minister for Lands (Hon. J. H. Coyne), in the course of a recent Press statement, has become contaminated with the lady-bird predator, which destroys the cochineal.

Mr. Coyne added: "In order that the purebred cochineals, which are now at the Government laboratory, should have a fair chance to exert their full effectiveness upon the prickly-pear pest when liberated, it is obvious that the public should wholly refrain from disseminating the so-called Chico cochineal with which is inseparably associated the cochineal destroying lady-bird beetle. If, however, the public persists in distributing this contaminated cochineal, the highly beneficial results which are to be expected from this group of insects, will, to a great extent, be lost."

### Railway Department Commended—Appreciative Fruitgrowers.

The Stanthorpe District Council of Fruitgrowers has written to the Commissioner, expressing satisfaction with the manner in which the fruit train from the Granite Belt was run during the past season. The department, it declares, carried out all details in connection with the running of the train in a way highly satisfactory to the growers, and the train invariably arrived at Roma Street well up to time, which enabled those in charge of the transport scheme at the Brisbane end to have the fruit unloaded in good time for the opening of the markets. In view of the criticism which was sometimes directed at the department, the council considers it only fair to say that it was very well pleased with the efforts of the department on behalf of the growers during the past season. The Commissioner has also received the following appreciative letter from the Stanthorpe Tomato Pool, through the Manager, Mr. J. S. Mehan:—

"Now that the operations of the Stanthorpe Tomato Pool have ceased, I am instructed by the board to thank you for the assistance give them throughout the season. Train staffs, gatekeepers, and station employees have carried out their duties to the mutual advantage of your department, my board, and the growers. It is with pleasure I forward the board's instructions."

### New Queensland Friesian Record.

The secretary of the Friesian Herd Book advises that a new Queensland Friesian record has been established by Mr. P. P. Falt's cow, Dairymaid. In nine months she has produced 15,792 lb. milk, and 696.58 lb. butter fat equal to 819¼ lb. commercial butter. She gave 4½ gallons of milk on the last day of her test.

Dairymaid was bred by the Queensland Agricultural College, and was sired by their bull, Denmark, now in the herd of Mr. R. S. Alexander, Toogoolawah. Her dam is Maid of Honour by Cheeseman. Dairymaid is eight years old, and one of the most handsome Friesian cows in the Commonwealth. Mr. P. P. Falt has in his stud at Tingoora, Kingaroy line, many fine Friesians, and has made good tests with several other animals.

### Nitrogenous Fertilisers—Comparative Experiments.

The "Experiment Station Record," pubished by the United States Agricultural Department, supplies some useful information on comparative experiments with different nitrogenous fertilisers. Experiments on clay, sand, loam, and peat soils on nine different varieties of crops extending over a period of four years were arranged in order to determine the relative fertilising values of sodium nitrate, sulphate of ammonia, and lime nitrogen. The results showed that nitrate of soda gave the best results in all cases, followed by sulphate of ammonia, and then lime nitrogen. Sulphate of ammonia gave its poorest and best results with potatoes, and its fertilising value varied from 64 to 94 per cent. of that of nitrate of soda. Lime nitrogen gave its best results with turnips, oats, and cabbage. Its fertilising value varied from 23 to 85 per cent. of that of nitrate of soda.

### Illawarra Butter Tests.

The secretary of the Illawarra Milking Shorthorn Society of Australia, 303 Queen street, Brisbane, advises that the cows Viola 26th of Darbalara and Bella 3rd of Kilbirnie, the property of Messrs. Macfarlane Bros., Kilbirnie stud, Radford, have completed their 273 days' test for the advanced register.

Viola 26th of Darbalara yielded 9,854¾ lb. milk and 367.84 lb. fat, 484.94 lb. commercial butter in the period. She was two years six months old at the beginning of her test, and was bred by the Scottish Australian Investment Company, Darbalara. She is by Flagon of Darbalara, ex Viola 12th of Darbalara.

Bella 3rd of Kilbirnie yielded 11,269§ lb. milk and 412.19 lb. fat, equal to 484.94 lb. commercial butter in the period. She was three years old at the beginning of her test, and was bred by Macfarlane Bros., Radford, Queensland. Her sire is Sovereign of Kilbirnie (31), by Piastre of Oakbank, ex Bella (111), and her dam is Bella (111), by Musket 3rd, ex Mayflower.

### The Drought Problem—A National Question.

The drought problem will probably be one of the first things tackled by Parliament when it meets in July. Included in important schemes for drought resistance, which the Government is now considering preparatory to introducing the necessary legislation, are proposals for water and fodder conservation for the farmers.

"These proposals," said the Minister for Agriculture and Stock (Hon. W. N. Gillies) in the course of a recent Press interview, "if carried into effect, together with the proposed co-operative legislation and rural bank, should make drought relief by the Government practically unnecessary.

"The whole policy of the Government and of the Council of Agriculture," added Mr. Gillies, "is to obviate the necessity of anything in the nature of charity, because farmers, as a class, are averse from charity. Hence the proposed legislation, which is the outcome of a comprehensive scheme drawn up by the Council of Agriculture.

"The Government agrees with the contention of the Council of Agriculture that fodder and water conservation are not questions alone for the farmers to solve. They are national questions, because any shortage of water and fodder affects not only the farmers themselves but the community as a whole. I am personally of the opinion that Nature has supplied us with an abundance of both fodder and water, and it is for man to conserve the bounteous things Nature provides. Even if these things have been neglected in the past, that is no reason why they should be neglected in the future."

"Meanwhile, the Government is giving effect to a scheme for the relief of settlers in drought-stricken areas in the West, on the Downs, and in the Burnett. Cabinet recently approved of this scheme, which provides for relief in the way of food and

clothing. The question of supplying fodder to settlers who have been hard hit by the drought has yet to be decided by Cabinet. Arrangements have already been made for the State Wheat Board to supply seed wheat at the expense of the Government to settlers who are financially unable through drought to purchase it.

"If a settler has no water on his farm, the sooner he is put on other land the better." This, as stated by Mr. Gillies, is the view of the Premier (Mr. Theodore). "It really involves a reclassification of land," commented Mr. Gillies, "and the proposed legislation will probably deal with this phase of the question."

### The Queensland Nut—A Thin-Shelled Variety.

The Queensland nut is generally recognised by those acquainted with it as one of the best flavoured of all the nut family, its only drawback being its very thick, hard shell. Some years ago plant breeders in Queensland endeavoured to find or breed a thin-shelled variety, but they met with no great success. Mr. J. B. Waldron, of Upper Eungella, Tweed River, however, recently brought under the notice of the Queensland Agricultural Department a very thin-shelled variety of this nut grown on his property. Mr. Waldron has a great variety of Queensland nuts growing on his place, the shells varying considerably in thickness and hardness.

Mr. C. T. White, Government Botanist, recently inspected the trees at Mr. Waldron's place, and brought back a number of seeds, from which it is intended to propagate at the Botanic Gardens and the department's nursery at Bribie Island.

It is hoped that similar success will follow the attempts to improve these nuts, as resulted in the case of American experiments with the cultivation of thin-shelled and large-seeded varieties of the pecan, for it is realised that there are great commercial possibilities with the Queensland nut once the shell difficulty is overcome. The commercial value of the Queensland nut has long been recognised in America, considerable numbers of these trees being grown in Florida.

### The Charters Towers Show.

The Annual Show of the Towers Pastoral, Agricultural, and Mining Association will take place on 11th and 12th of July. In the April Journal the Towers Show was inadvertently listed for the following month, and probable visitors and exhibitors are advised that the 1923 dates for this important Northern exhibition are definitely as abovementioned.

### Land for Settlement.

In extending a welcome to the Overseas' Settlement Delegation on behalf of the Government of Queensland, the Minister for Agriculture and Stock (Hon. W. N. Gillies) said that the Government appreciated the importance of their visit, and he wished them to clearly understand that his Government were not opposed to immigration on sound, healthy lines. He explained that during the war and its aftermath his Government, in common with all other Governments, found it difficult to carry out large schemes of land settlement, and until recently had done very little except to deal with returned soldiers and local applicants. He was now pleased to be able to say that the Government had several large land settlement schemes under way and receiving consideration. These included the Upper Burnett and Callide Valley, about 3,000,000 acres; Clermont and Capella, 180,000 acres; Palmerston, 180,000 acres; Roma (wheat lands), 484,000 acres; Goondiwindi (wheat lands), 254,000 acres. There was also the Dawson River irrigation area, Tully-Banyan sugar lands, Boonjee and Upper Tully scrub lands, in all about 5,000,000 acres. Some of these schemes, Mr. Gillies said, were well in hand, and the Lands Department advised that during the next financial year, not fewer than 2,000 families can be settled on these areas. It will be seen, therefore, he said, that immediately local demand is satisfied there will be plenty of room for overseas settlers. The desire is that when the settlers arrive from overseas, either employment or land must be available for them. To simply bring settlers here without making proper provision for them would be no good to the immigrant or to Queensland.

### Activities of the N.U.P.B.A.—Awards—Egg Pool Favoured.

At the last monthly meeting of the National Utility Poultry Breeders' Association, held in the National Association Rooms, Mr. A. S. Walters presided over an attendance of about sixty members. Prizes won in the recent Zillmere Single Pen Egg-laying Competition were presented by Mr. J. M. Manson. In the course of his remarks Mr. Manson stated that he had recently toured the South, and had visited one large poultry plant where employment was found for several workmen and large income taxes paid each year by the proprietor. In view of the fact that, in his opinion, sunny Queensland was, in comparison with other States, wonderfully adapted to poultry keeping, Queensland poultrymen should some day be in a like position.

The first prize for highest individual score, a £5 5s. trophy donated by Mr. Manson, and first prize for highest aggregate, a pedigree 300-egg cockerel bred by Kidd Bros. from recent importations, were both won by Mr. Davis, a veteran in the poultry world. Second prize in White Leghorns went to Mr. A. Cowley, of Gap Soldiers' Settlement. Mr. E. F. Dennis's Black Orpington won first in the heavy breeds, while Mr. M. H. Campbell's donation for highest winter test went to Mr. Sherman. Mr. M. J. Lyons's White Leghorn hen won the type prize in the light breed section, and Mr. H. Pearce's Black Orpington carried off a similar prize in the heavy variety, both prizes being donated by Mr. W. R. Parker. Competitors listed as under won certificates for birds which laid 250 or more eggs of standard weight, viz.:—Messrs. Neil, Woodward, J. E. G. Purnell, A. Hodge, R. D. Chapman, W. H. Lingard, C. C. Dennis, G. Trapp (2), J. Hutton, P. J. Fallon, T. J. Carr. Mr. Manson promised another £5 5s. trophy for competition in the current test, and raised a short discussion on weight of White Leghorns, as he considered 3½ lb. too heavy for a pullet of, say, five and a-half months. In reply, Mr. Campbell stated that the Zillmere Competition was the most stringent in the Commonwealth, and he would be very sorry to see this condition altered.

Mr. Manson's concluding remarks were listened to with great interest. Within the next few weeks, he stated, Queensland poultrymen would be required to settle a question of vital importance to the industry. Mr. Manson stated that his business brought him into contact with a great number of businesses controlled by pools, and he was convinced that pooling was a great advantage to both the producer and consumer, the former receiving a fair return for his labour, and the latter being protected from exploitation by speculators and "cornering" of market produce. He quoted several instances, the chief being the currant and raisin industry of Victoria, which was started and financed with the idea of helping the farmer, not exploiting him. The results had been marvellous; it did not pay to keep out of the pool. Several other examples were mentioned, such as the canary seed and arrowroot industries, which had been placed on a sound financial footing by pooling under Government encouragement, when previously failure had stared the producer in the face. He was certain that the Egg Pool would be a brilliant success. Mr. Campbell especially emphasised and endorsed Mr. Manson's remarks about pooling, as the aims and objects of the pool had been considerably misrepresented. With one exception every *bonâ fide* poultryman present was in favour of pooling.

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# Answers to Correspondents.

**Black Mauritius Bean.**

T. G. (Childers).—The Government Botanist, Mr. C. T. White, F.L.S., advises:—The specimen sent for identification is the Black Mauritius Bean (*Stizolobium aterrimum*). The bean is largely grown in tropical and subtropical countries as a green manure. It has been in Queensland for some years, but has not, I think, been cultivated here to any extent. Its use seems solely as a green manure, as I have not seen any reference to the vines being used as fodder, or the seeds for human food. It is very closely allied to the Florida Velvet Bean.

**Kola Nut.**

J. A. H. (Gooroolba)—The Government Botanist, Mr. C. T. White, F.L.S., replies.—The Kola Nut is a native of tropical Africa. It requires a hot tropical climate for its growth. Young plants have been raised under glass at Brisbane, but will not stand planting out. It might do all right at Cairns, but it is not likely to succeed much further south. There is a very big export of Kola Nuts from the Gold Coast, tropical West Africa, the value being well over £100,000 per annum. The principal consumers are the natives of tropical Africa, and the nut enters largely into the social and dietetic economy of their daily life. It is eaten largely as a stimulant. The tree was introduced into the West Indies for the benefit of the negroes in the slave days, and has become naturalised at Jamaica and some other parts. Kola Nuts are not usually planted but the nuts gathered from wild trees. The trees start to bear at six to seven years, though the crop at this time is small. Trees are planted about 20 feet apart each way.

# Orchard Notes for July.

## THE COAST DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded, good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to fix standards of quality and see that the fruit offered for sale complies with the standards prescribed and that the cases are marked accordingly.

Where the crop has been gathered, the trees can be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning out of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated, do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree, cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree, and when the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer parts a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that can be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees can be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

Land intended for bananas and pineapples can be got ready, and the existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for sending South can be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales, when they may be injured by the cold.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from black heart (the result of a cold winter) or from fruitlet core rot, they can well, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former, and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing, well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before spring growth starts.

With regard to pruning, follow the advice given in the June number; and if you are not thoroughly conversant with the work, get the advice of one or other of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out, it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth, and on spurs; but peaches and nectarines always on wood of the previous season's growth, as once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees can be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting can be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

# Farm and Garden Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine, and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—*i.e.*, when about one-third of the plants in the crop are in flower.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holly-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

## TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

| 1923. | JULY. | | AUGUST. | | SEPTEMBER. | |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·46 | 5 6 | 6·36 | 5·20 | 6 9 | 5 36 |
| 2 | 6·46 | 5 6 | 6·35 | 5 21 | 6·8 | 5·36 |
| 3 | 6·46 | 5·6 | 6·34 | 5·22 | 6 7 | 5·37 |
| 4 | 6 46 | 5·6 | 6·33 | 5·23 | 6·6 | 5·37 |
| 5 | 6 46 | 5·6 | 6·32 | 5·24 | 6·4 | 5·38 |
| 6 | 6·46 | 5·7 | 6·31 | 5·24 | 6·3 | 5·38 |
| 7 | 6·46 | 5·7 | 6·31 | 5·24 | 6·2 | 5·39 |
| 8 | 6 46 | 5 7 | 6·31 | 5 24 | 6·0 | 5·39 |
| 9 | 6 46 | 5 8 | 6 30 | 5 24 | 5·59 | 5·40 |
| 10 | 6·45 | 5·8 | 6·29 | 5·25 | 5·58 | 5·40 |
| 11 | 6·45 | 5·9 | 6 29 | 5·25 | 5·57 | 5·41 |
| 12 | 6 45 | 5·10 | 6·28 | 5·26 | 5·56 | 5·42 |
| 13 | 6 44 | 5·11 | 6·27 | 5·27 | 5·54 | 5·43 |
| 14 | 6·44 | 5·12 | 6·26 | 5 28 | 5·53 | 5·44 |
| 15 | 6 43 | 5·12 | 6 25 | 5·29 | 5·52 | 5·44 |
| 16 | 6·43 | 5 12 | 6 25 | 5 29 | 5·51 | 5·44 |
| 17 | 6·43 | 5·12 | 6·24 | 5·29 | 5 50 | 5·44 |
| 18 | 6 43 | 5·13 | 6·23 | 5·30 | 5·49 | 5·45 |
| 19 | 6 43 | 5·13 | 6·22 | 5 30 | 5·48 | 5·45 |
| 20 | 6·43 | 5 13 | 6 21 | 5·30 | 5 47 | 5·45 |
| 21 | 6 42 | 5·14 | 6·20 | 5·31 | 5·46 | 5·45 |
| 22 | 6·42 | 5·14 | 6·19 | 5·31 | 5·45 | 5·46 |
| 23 | 6 42 | 5·14 | 6·18 | 5·31 | 5·44 | 5·46 |
| 24 | 6 42 | 5·15 | 6·17 | 5·32 | 5·43 | 5·46 |
| 25 | 6 41 | 5·15 | 6·16 | 5·32 | 5·42 | 5·46 |
| 26 | 6 41 | 5·16 | 6·15 | 5·33 | 5·41 | 5·47 |
| 27 | 6 40 | 5·17 | 6·14 | 5 33 | 5 39 | 5·47 |
| 28 | 6·40 | 5·17 | 6 13 | 5·34 | 5·38 | 5·48 |
| 29 | 6 39 | 5·18 | 6·12 | 5·35 | 5 36 | 5 48 |
| 30 | 6·38 | 5·18 | 6·11 | 5·35 | 5·25 | 5·49 |
| 31 | 6·37 | 5·19 | 6 10 | 5·36 | ... | ... |

## PHASES OF THE MOON, OCCULTATIONS, &c.

6 July ☽ Last Quarter 11 56 a.m.
14 „ ● New Moon 10 45 a.m.
21 „ ☾ First Quarter 11 32 a.m.
28 „ ○ Full Moon 8 33 a.m.

7th July, Apogee, 9·48 p.m.
22nd „ Perigee, 11·54 a.m.

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5 Aug. ☽ Last Quarter 5 22 a.m.
12 „ ● New Moon 9 17 p.m.
19 „ ☾ First Quarter 4 7 p.m.
26 „ ○ Full Moon 8 29 p.m.

4th Aug. Apogee, 4·24 p.m.
16th „ Perigee, 8·0 p.m.

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3 Sept. ☽ Last Quarter 10 47 p.m.
11 „ ● New Moon 6 53 a.m.
17 „ ☾ First Quarter 10 4 p.m.
25 „ ○ Full Moon 11 16 a.m.

1st Sept. Apogee, 10·54 a.m.
13th „ Perigee, 8·24 a.m.
29th „ Apogee, 3·24 a.m.

During July the planet Mercury will pass eastwards, apparently from the constellation Taurus, through Gemini and Cancer into Leo. Venus will also apparently pass from Taurus through Gemini into Cancer, Mars from Gemini into Cancer. Jupiter will seem to move only about one degree eastward in Libra, while Saturn will apparently move about a degree and a half further east amongst the stars of Virgo.

From 1st August to 30th September Mercury and Venus will apparently move on through Leo into Virgo, and Mars from the eastern part of Cancer to that of Leo. Jupiter will apparently move only about eight degrees further east in Libra, and Saturn about five and a half degrees in Virgo.

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A partial eclipse of the moon, visible in Queensland, will take place about 9 o'clock in the evening of 26th August.

A total eclipse of the sun will take place a fortnight later, visible only in the North Pacific, Central America and Gulf of Mexico.

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For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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